REGD. NO. TN/MS (C) 395

35th YEAR OF PUBLICATION

ISSN 0045/6500
R.N. NO. 1972/57

Chemical Weekly

VOL. XXXV FEBRUARY 6, 1990 NO. 22

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CHEMICAL WEEKLY

VOL. XXXV FEBRUARY 6, 1990 NO. 22

HERALDING THE 21st CENTURY - 37

Fuelling the Future — the Chemical Way

Growing concerns about air pollution and the greenhouse effect have stirred new interest in fuel cells, devices that nerate electricity through chemical reactions. The appeal fuel cells is clear. They are quiet, they produce little pol-ion and they are more efficient than conventional power ants at converting the energy in coal, oil and natural gas o electricity.

But for nearly 30 years, high costs and the reluctance of th equipment manufacturers and electric utilities to plunge to new generating technologies — after disappointments ith nuclear power — have kept the cells always on the hori-n. Fuel-cell advocates say the time may now be right to vercome these obstacles. The concept of a fuel cell was escribed as far back as 1839, although the first practical pplications came in the United States space programme of e Sixties. Fuel cells provided power for the Gemini and pollo missions and three 175 fuel-cell units generate the n-board electricity for the space shuttles.

Fuel Cells — The Principles: A fuel cell has two elec-odes and an electrolyte — rather like a battery —, but is ontinuously fed with fuel and oxidant. The fuel, which does ot have to be a gas, must be reformed either internally or xternally to produce H_2-rich reducing gas which is fed to e anode. The oxidising agent (air or O_2) is fed to the athode. The electrodes catalyse the oxidation and conduct lectrons to a current collector. The electrochemical reactions ccur at the electrode-electrolyte interfaces and chemical nergy is thus converted into electrical energy. The process hould be 60 per cent efficient. Cells are usually switched n series or in parallel to give higher voltages and currents. his forms a fuel cell stock.

Sir William Robert Grove (1811-96) was the man who tarted it all. In 1839 he invented the Grove cell, a primary attery comprising several small cells in glass vessels, with he electrolytes separated by clay tobacco pipe bowls. The ositive pole was Zn and the negative Pt. This cell was lemonstrated to the British Association for Advance of cience and the Paris Academy.

Grove's gas battery — the first working fuel cell-was first eported in 1839, hence the 150th anniversary celebrations n 1989, but it was not fully developed until 1842.

In the 1950s F.T. Bacon and coworkers at Cambridge produced the first practical fuel cell, using hydrogen fuel and an alkaline electrolyte — this meant that cheaper Ni electrodes could be used instead of Pt. This cell was modified by United Technologies Corporation in the US for use in the Apollo space programme. Fuel cells today still have something of the crock of gold about them. They would be modular, flexible in fuel requirements, efficient and environmentally friendly. Fuel cells have taken man into space but other practical developments have been disappointingly slow.

In most cells the products of reaction is water vapour and carbon dioxide. At 100% efficiency 400 gms of water vapour per kw is produced which has to be disposed of besides 250 kilocalories of heat which has to be dissipated to maintain the temperature. The capital cost of a fuel cell system is US$ 1000/KW which is not currently attractive now and the cost of production also is expensive.

Progress was surveyed in September 1989 at the Grove anniversary fuel cell symposium, appropriately held at the Royal Institution in London. Currently, the main types of fuel cells are: alkaline (AFCs); phosphoric acid (PAFCs); molten carbonate (MCFCs); and solid oxide (SOFCs). Consisting typically of solid Y oxide doped with Zn as developed by Westinghouse in 1962, it operates at a high temperature and performs internal reforming of the fuel if the catalyst is built into the anode. SOFC performance is good and may be transformed by the new ceramics now available. The best FC performance achieved so far is with an AFC using hydrogen fuel, but when conversion efficiency is considered, the MCFC comes out on top. This cell can approach 100 per cent efficiency of conversion with internal reforming, though external reforming does reduce this figure. The main problems of MCFCs are the temperature distribution and transfer of electrolyte.

PAFC's are now projected to establish a niche in the electric and gas utility markets and other application areas by providing benefits in terms of fuel savings, environmental impact and packaging and siting logistics. Current phosphoric acid cells use phosphoric acid as electrolyte with relatively clean, reformed fuels such as light distillates, LPG, natural gas etc. The major driving force for its dominant position

has been the widespread view in the U.S. that it alone among the lower temperature FC's shows relative tolerance for reformed hydrocarbon (HC) fuels (Steam raised in the FC is used for reforming, CO is removed by a still reaction and rejection of CO_2 occurs naturally by acid).

Crucial accomplishments in the emergence of PAFCs as a commercially acceptable power system have involved the qualification and exploitation of carbon materials as the backbone of the fuel cell stack, reduction of electrocatalyst platinum (Pt) loadings by more than an order of magnitude with the substitution of highly dispersed carbon supported catalysts for the platinum (Pt) black types used previously and the elevation of operating temperature by 60 to 80°C to about 200°C which has resulted in significant augmentation of cell and overall system efficiencies. PAFC's are now projected to establish in the electric and gas utility markets and other application areas by providing benefits in terms of fuel savings, environmental impact and packaging and siting logistics. Although phosphoric acid has clearly been the acid electrolyte of choice because it has acceptable stability, volatility, compatibility and capillary properties, its electrode kinetic properties are poor. Studies with fluorinated sulphuric acid electrolytes have demonstrated substantially improved electrode kinetic activity over that exhibited by PA.

Alkaline Fuel Cells: Alkaline fuel cell technology was developed in early 1960 for the NASA programme. These cells have longer life, wider choice of catalysts, offering efficiencies upto 68% and lower cell component cost with potential for use in transportation.

Multi Fuel — Fuel Cells: An electrochemical reactor fuelled by gasoline and air and running at 1000°C within a rupture resistant, thermally insulated box will yield 50 KW of power — the equivalent of 66 horse power. This energy will drive a compact electric moter.

Dutch FC Programme: With the Japanese and US AFC efforts far ahead, the Netherlands has concentrated on MCFCs working at 650°C. At this temperature the cell's K_2CO_3 and Li_2CO_3 content is an aggressive mixture that can attack the other cell components. Ceramics can cope with these conditions and offer, through their porous structure, an excellent means of keeping the reagents where you want them. At the Netherlands Energy Research Centre near Petten, scientists have been working for three years on materials that will allow the exchange of gases in the larger pores of the electrode while carbonate melt is safely confined in the smaller pores of the matrix that separates the electrodes. The nickel aluminium oxide alloy used for the electrodes and matrix allowed the Dutch to make plates up to 1000 Cm^2. Twenty such plates were combined to set the European power record for MCFCs at 1kW, but 10kW is within reach.

Scaling up the reaction site in fuel cells produces smaller units with lower resistance but the same power. The new Dutch unit converts chemical energy to electrical with 35-40 per cent loss, this being 20 per cent more efficient in energy conversion than the average tribune. The average temperature of 650 C allows for the use of steam in heating units or for the conversion of natural gas into hydrogen. The green lobby is an important consideration in the US. FCs can realistically be used in transport and recent legislation on emissions has made FCs more attractive. Forecasts show an increase in vehicles per capita worldwide. By 2025 the p ulation will have doubled and there will be about 1000m ve cles around. It is not unreasonable to predict the advent cars running on hydrogen, with no reforming, showing th times the efficiency of the internal combustion engine with no emissions except some ozone.

In the early 1970s work by Fujishima and Honda in Ja led to an enormous upsurge of interest in the use of phot lectrochemical cells which could use solar energy to prod energy directly. They may also be used as storage cells to produce useful chemical products.

This work has been followed up in Europe, Japan and US over the past 10 years. Currently it seems likely that most efficient approach is to combine photovoltaic cells w fuel cells in the same way that the latter could be used store electricity produced by nuclear power. With curr technology the photocell is an expensive, small scale sou of energy and many would be needed to produce a reas able amount. However, we need such primary sources the future.

Interestingly, there has been something of a renaissa in SOFC technology. First developed by General Electric NASA in the 1960s, this FC had the advantages of h energy density, used no corrosive electrolytes and was sim and robust. An SOFC based on a crosslinked styre divinylbenzene and fluorocarbon polymer membrane ha lifetime of 500 hrs. sufficient for the requirements of Gemini space capsules.

Du Pont's Nafion was shown in the 1960s to improve li time further to 40000 hrs. but by this time NASA had cho the AFC for its Apollo mission. This decision put SOF into the background for 20 years, but in the mid 1980s B lard began work under the Canadian Government to m SOFCs for military use. They made many cost and perfor ance improvements but the single most important factor w a new ion conducting polymer membrane from Dow Co ing, introduced in 1987. This polymer is similar to Naf but produces four times the power at the same voltage. FC runs at room temperature.

Ballard is committed to commercialising the SOFC a has a 2kW hydrogen/oxygen FC for use in a small subm ine. The Los Alamos National Laboratory has also been inv tigating SOFCs for transport since 1982.

Investing in FCs today could answer our power needs tomorrow, but governments need to take a higher profile this issue. One FC power station built in the US for use Japan can produce 4.2 MW—still a bit small for public u but a step ahead. A major cost is in cleaning up the fo fuel feed for power stations — otherwise there will still acid rain and the costing needs to consider all fuel clean and reforming, which depends heavily on legislation and availability of traditional fuel resources.

Ostwald's dream that the 20th century would be the of Electrochemical Combustion did not come about, beca of slow electrochemical reaction rates and the developm of the combustion engine. But the energy scenario may very different in the 21st century.

— T. P. S. RAJA

CHEMARENA

.L. VENKITESWARAN

Mess-up in Petroleum Planning?

The oil refinery industry of India is one where there is pparently some mess-up in planning. We have commented n the acute problems which the country may face if the rowth in demand of petroleum products continues at a frantic pace for the next decade. A recent analysis of the foreign xchange outgo as a percentage of our export earnings reveals hat while it was as much as 45% in 1983-84 and 1984-85 the percentage has declined to 20.6% largely as a result of the rise in indigenous production and the decline in price of mported crude, as a result of the protracted dispute among the OPEC countries on relative shares of exports to the rest of the world. India has touched 32 million tonnes of crude ast year but still imports about 20 million tonnes of crude and products. But conditions are now different. The Iran/Iraq war has ended and there is a level of accord on the sharing so that prices are already firming up to over $18 per bbl. India's production may not rise except perhaps marginally and that too by higher rates of withdrawal from the areas. The deficit is building up and may cross 30 million tonnes before AD 2000 which may require over Rs.7000 crores assuming escalation and the erosion of the rupee.

The other problem is of refining capacity which is now at 48.6 million tonnes and may need to be stepped up to over 90 million tonnes by AD 2000 — the equivalent of 6 new refineries. Two new ones are on hand — Karnal and Mangalore and one more in Assam as per the accord. Some expansions of existing refineries at Cochin, Madras, Vizag and Haldia would be possible, but there are four new refineries of 6 million tonnes a year at inland locations being talked about. Karnal and Mangalore are in partnership with the private sector and their investements are set to be over Rs.1500 crores on each. Added to this are the logistics of crude and product movements requiring heavy outlay on terminals and pipelines.

No doubt these are all being reckoned in the plans for the decade but perhaps without the financial resources which could become available and be mobilized. Karnal Refinery has made little progress and the Mangalore Refinery (with ambitions on petrochemicals to be included) is yet to take firm shape. Meanwhile, plans are for an inland refinery in perhaps Hoshangabad, besides one more coastal refinery in Paradip — of plans for expansion of various refineries but there was hardly any mention of Haldia. Tamil Nadu may see a small 1 million tonne refinery taking shape to handle the oil of Kaveri basin.

A matter which requires urgent consideration but has received little thought is the extent to which we can bank on supplies of crude petroleum from external sources and at what cost. The means to move crude oil or products based on such imported crude, particularly through pipeline networks over long distances for products and the costs needs to be assessed very carefully. We have been talking of product pipelines from Bombay to Pune and of naphtha to Patalganga but not much has been achieved.

The pipeline from Cochin to Coimbatore for further inland distribution should have been on high priority but still seems to be in the planning stage. But plans for product pipelines from refineries yet to be taken on hand have been approved — viz the Bhatinda to Kandla product pipeline. This is a Rs.700 crores project stretching to 1331 km and already cleared for World Bank assistance. The pipeline is expected to save Rs.70 crores per year in costs and feed areas of high demand from Karnal Refinery. But apparently Railways have also been asked to lay BG lines on this route by conversion and additions —about 700 km for conversion.

The Railways expect costs to be Rs.850 crores but the bulk of the traffic will be of petroleum which is now to be taken out for movement by proposed pipeline. It is difficult to know whether this is the result of the un-coordinated action by different agencies or overenthusiasm for the dawn of the 21st century.

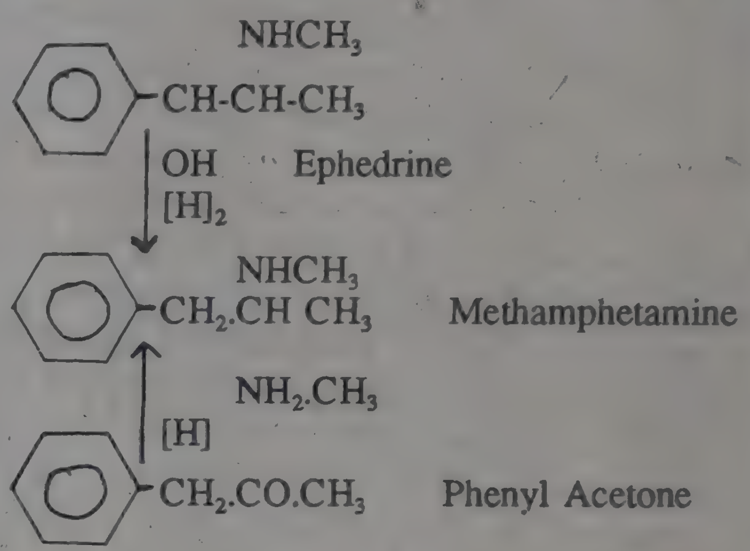
The controversy had been dormant for a while and will be one of the top priority matters for recommendation of the Planning Commission (which has generally been sidelined in these matters) on the Railway vs Pipeline links between Kandla-Bhatinda. Apart from this priority issue the Planning Commission may also have to look at the basic questions of the petroleum demand growth in the light of the country's economic resources, the realistic assessment of oil production in the decade ahead, the level of imports which could be sustained and refining capacity additions required at specific centres.

Fight Against Methamphetamine

The fight against drugs in USA and the President's concern has gone to such an extent as to send troops into neighbouring countries such as Panama which serve as transit centres for the top king pins who control it. US has also helped some South American countries to destroy the crops from the air. But the menace continues in alarming proportions. India is a transit point for drugs of Afghan and Pakistani origin and has been in the forefront of the fight in this part of the world. But India has also fallen a prey to the drug culture with thousands of young addicts. India is the world's largest legal producer of opium alkaloids and a supplier for the legitimate medical needs. Illegal plantations in isolated tracts such as in the southern hill regions have been destroyed to the extent possible.

But older products are being revived or new ones taking shape with the objective of eliminating US need for imported supplies. Methamphetamine is the latest of these — "ice" in the addicts parlance which is "smoked". It's effect is said to last for hours more than : caine. In Hawaii such "ice smoking" seems to have spread as alternative to marijuana. But methamphetamine is said to be not safe and may lead to serious lung diseases. Methamphetamine is also a drug prescribed for obesity and hyperactivity. Addiction is readily acquired. During earlier years this drug — Speed — was used intravenously but smoking is easier. Illicit methamphetamine is said to be made in clandestine laboratories in Hawaii and elsewhere and widely available. The total number of seizures by Drug Administration have quadrupled to 800 in 5 years in USA.

The basic chemistry has been known for decades and the production organised with low investment but high returns. Ephedrine is said to be the base or alternately phenyl acetone as shown in the sketch. The starting chemicals are easy to procure. US is worried that more such illicit laboratories will spring up and supplement or replace heroin. There will be less difficulty for pushing the poison down the increasing thousands who live in conditions which encourage drug abuse.



China's Chemical Industry

The recent meet of Chemasia 89 in China organised jointly by China and West Germany gives a picture of the progress and plans for chemicals in China. It gave a vision of the prospects through the get together of engineers and biotechnologists and specialist firms.

China has been making rapid progress for a decade or so after the opening of a door to the West but there has been a minor setback after the recent Tianamen disturbances. As is to be expected there are several state organisations to manage chemical industry with China Petrochemical Corporation, SINOPEC, playing leading role. The production rose from \$ 45 million in 1949 to \$ 18 billion in 1988. Besides SINOPEC there are three State undertakings to make SBR, caustic soda, fertilisers, drugs etc. The recent emphasis is on petrochemicals and use of gas and oil reserves. Technology and equipment are imported with Japan a major supplier.

In 1959, 35,000 tonnes of ethylene from heavy oil and polyethylene and other petrochemicals were started on a small scale. The seventies saw a big thrust in these with more import of technology by SINOPEC. Ethylene production and capacity over recent years and of its downstream products is in the following Table. SINOPEC also controls 94% of refinery capacity besides 85% of ethylene capacity. In 1980 four ethylene plants of 3,00,000 tpa were contracted for alongwith downstream plants and the last of these will be completed this year.

(Thousands of tonnes)

	1983	1988
Ethylene capacity	680	1620
Ethylene production	653	960
Plastics	1121	989
Synthetic fibres	957	1420
Synthetic rubber	168	192

Foodgrain production has the highest priority and so also of fertilisers. In 1952 the grains production was 163 million tonnes using only 78,000 tons of chemical fertilisers. In 1987 these rose to 400 million tons using 20 million tons fertilizers. China started with small plants using own technology — over a thousand of these — and later on 13 large modern nitrogenous fertiliser plants were imported. China is perhaps the third largest in fertiliser production. China's target is 400 kgm grain per capita per year using 30 million tonnes fertilisers by AD 2000. They prefer use of coal for ammonia and phosphate based on electric power as sulfur sources are low. Pesticides are another area of priority and in 1989 the production was about 2,00,000 tonnes (formulations).

Another matter of great emphasis is on natural products and their recoveries. China's exports and imports of chemicals are subject to wide swings and often create serious market and price disruptions. But China is on the way towards being a major chemical centre.

Waste water management in chemical industry highlighted

The Institution of Engineers (India), Gujarat had organised a one day seminar on Dec. 2, 1989 at Ahmedabad to highlight the recent trends in water treatment technologies. The seminar was attended by some 147 delegates from all over the country. Shri P.A. Raj, Vice-Chairman and Managing Director, Sardar Sarovar Narmada Nigam Limited, was the Chief Guest at the function and Shri R.K. Trivedi, Governor of Gujarat delivered the inaugural address.

A vital requirement

In his introductory remarks on the theme of the seminar, the convenor, Shri A.K.A. Rathi, noted that water was an essential requirement for any industry and more particularly for the chemical industry. Considering the rising costs of all the inputs, we have to take timely measures in reducing costs of all the inputs, howsoever small they may be. We may adopt the principles of value engineering for this purpose. It is very essential that concerted efforts be made in optimal utilisation of all the resources including water.

"Among the various inputs for an industry, the cost of water is insignificant for most of the products. But in absolute terms the requirement is very large. The importance of water may be judged from the fact that without water the industrial wheels simply stop and there appears no alternative. The analogy may be drawn from the fact that an automobile can't run without water for its radiator cooling though it may cost almost nothing.

"Even in the water intensive process of paper making, the cost of water may be 2-3% of total cost of production. Could this be the reason that enough attention is not being given for water conservation in industry?

"I would like to quote Mr. Klaus Wahl, Head of the Deptt. of Industrial waste water treatment at Dornier, FRG; "The reason why most Indian industries are not interested in recycling waste water into the process after treatment is because the fresh water rates here are very low. Recycling to save on fresh water demand is not cost-effective. It is very surprising that water is priced so cheap in India despite the scarcity and the high cost of supplying it". These words are really thought-provoking. Should the cost of water be enhanced several folds or should the water supply be drastically cut to motivate the industry to reduce its water consumption?

"During the drought period, the industry is the first victim to face water cuts. During good monsoons, the industry may plan for proper water utilisation in such a way that it is able to meet its requirements during days of water shortage.

"These are some of the aspects which prompted us to organise this All India Seminar on "Water Management in Chemical Industry", primarily to discuss various techniques of water management in industry with an emphasis on case studies, highlighting industrial practices and the latest developments.

"We have papers from different industries including petrochemicals, fertilisers, gas processing, rayon, integrat[ed] chemical complex and on desalinati[on] techniques. We have organised the fi[rst] business session as plenary talks fr[om] two eminent companies viz. Tata Ch[e]micals and Ion Exchange (India). T[he] other two business sessions shall ha[ve] nine papers for presentation. The parti[c]ipants include representatives from t[he] organisations supplying water, usi[ng] water and the organisations engaged [in] developing water treatment systems.

"It is hoped that the deliberatio[ns] will be useful to the participants and w[e] shall be wiser at the end of the day [in] managing water in our industries".

Industrial water shortage to ea[se] after Sardar Sarovar

In his address to the audience, Sh[ri] P.A. Raj, the Chief Guest noted th[at] abundant supplies of water will [be] available once the Sardar Sarovar pr[o]ject was completed. As you all kno[w] water is next only to air in terms [of] importance for existence and develo[p]ment of life and civilisation. In terms [of] quantity also, the volume required f[or] survival of life is next to air.

"According to the current estima[te] the total volume of water on earth [is] 1400 million km³ of which abo[ut] 97.3% is ocean water. Thus, the fre[sh] water is only 2.7% of the total glob[al] water. Bulk of this is again in polar ic[e] caps and lying at great depth belo[w] ground. Large volumes are drained [to] sea during floods. Finally, the wat[er] which can be used by man is less tha[n] 0.5% of fresh water, which correspond[s] to 1 in 10,000 parts of the total wat[er] on the earth.

"The utilisable surface and groun[d]

water resources of the country is 1100 km^3 which would work out to about 1600 m^3 per head per year. By the year 2000 AD the total water consumption is anticipated as 750 km^3 of which 630 km^3 would be for irrigation and 120 km^3 would be for other uses. By 2025 the corresponding figures are expected to be 1050, 770 and 280 respectively. The industrial demand which presently is of the order of 2% is expected to go up to about 11% by the year 2025.

As far as quality of water is concerned, it should be very good for domestic as well as industrial use. For irrigation, a comparatively little inferior quality may be tolerated. The water rates generally charged by the government for irrigation and even for domestic water supply and industrial use are highly subsidised. The rates for water supply involving transport by tanks to a lead of 50 to 200 kms works out to Rs. 10 to 20. If the transport is by railway covering a distance of about 250 km, rate works out to about Rs. 60. If transported by ship from Bombay, rates may be as high as Rs. 350. Against this actual rate, we are charging in government irrigation schemes hardly 20 np. per thousand litres. For domestic water supply and industrial water use this may vary from Rs. 1 to Rs. 3 although the economic rates may be very high.

"The Sardar Sarovar Project is the real drought proofing scheme and the life line of Gujarat. It would cater to irrigation of 18 lakh ha. spread over 62 talukas and 3400 villages. 75% of the area is drought prone. It would also cater to domestic and industrial use for 131 towns and 4720 villages. Out of 9.0 Maft. allocated by the Tribunal 1.06 Maft. is reserved for domestic and industrial water supply. This works out about 3500 millilitres per day. Particularly after the completion of Sardar Sarovar Project, I do not see any difficulty for sparing water for industrial use at any point in entire Gujarat. I would request all the industries to treat the effluents very effectively and release them for alternate purposeful use".

In his inaugural address Shri Trivedi noted that Gujarat was emerging as a major chemical region but this is likely to create its own problems, particularly as far as water resources are concerned. The recent investment of Rs. 10,000 crore in the already booming chemical industry and its sectors was likely to exacerbate the water shortage in the State, unless industries themselves begin giving priority to water management.

It was the ample availability of water which had given Gujarat an important position on the industrial map of the country, but this smooth flow of water may not continue, he cautioned. South Gujarat was once a water surplus region but today the situation was such that it was difficult to set up a water intensive industry in the region. In recent years, many villages of even South Gujarat had began facing scarcity of drinking water. The days are gone when industry was hardly worried about the basic inputs like power and water. Today in South Gujarat tapping of river beds to meet the growing needs of water at locations like Hazira and Wagra is already under consideration.

Moreover, industry has also begun relying on canal water at many places, putting a cut in irrigation water. To gauge the possible impact of constraint of water supply on the industrial and economic development of the State, one had just to look at the north and north eastern regions of Gujarat. The regions even now faced the major problem of scarce water for industrial use.

Under these circumstances, Shri Trivedi noted that it is very essential that basic inputs especially those which are scarce such as water are conserved and managed properly by the industries. The inaugural session was followed by three business sessions in which nine papers were presented.

evision of 1986 Drug Policy contemplated

he Union Minister for Petroleum Chemicals Mr. M.S. Gurupadas- ny announced at Bangalore recently the government was contemplating sing the 1986 Drug Policy in line n the Hatti Commission recommen- ions. Inaugurating the third National nvention of Chemists and Druggists, Minister said the committee headed Mr. Bhatti, Chairman of the National uncil for Applied Economic earch, was looking into the entire nut of issues relating to drug prices.

The minister called for the adoption generic drugs in the place of branded gs to break the stranglehold of nopoly drug manufacturing firms in country. The minister called for a alitative change in the situation so t market forces would secure an endency in the drug industry. He led for higher investments in the nufacture of drugs for common ail- nts.

Mr. Gurupadaswamy, announced that government would pay greater atten- n for creating adequate healthcare rastructure and a health support stem throughout the country. He also lled for the provision of safe drink- g water for the people in the rural eas.

The minister reminded that equal sponsibility rested on all the con- rned people in the field — the man- acturers, the doctors, the retailers and hole sale distributors of drugs and armaceuticals — to see to it that only ality drugs were provided to the ople. While substandard drugs should e destroyed completely, the standard rugs should be kept and stored in the rescribed ways. "The drugs that are ot stored as per the recommended con- itions or that are affected for reasons eyond one's control, should not be dis- ributed to the people."

Mr. Nilamani Routray, Union Minister for Health and Family Welfare, exhorted the druggists and chemists to educate the people about the side-effects of the drugs that were sold to them and the precautions they should take to escape from its ill-effects.

The Health Minister said, it was essential that the persons involved in the selling of modern drugs should have a sound knowledge of the characteristic properties, of the drugs sold by them.

He said the National Health Policy of the government would have as its key elements the need for preventive health care and the provision of primary health care. He said all efforts would be taken to make available all life-saving and essential drugs to the people in rural areas.

The Karnataka Minister for Health and Family Welfare, Mrs. Manorama Madhwaraj, said the state government would sympathetically look into the problems faced by druggists and chemists in the state. She informed that the demand for reduction of sales tax on drugs would be considered. She also found merit in the plea for restricting the issue of licences for new shops.

She said the aim of the country's drug policy should be to ensure abundant availability of drugs at reasonable prices. "As we are almost dependent on the drugs made in the developed countries, we should focus on enlarging the scope of research in the field", she said.

SHREEJI COLOURCHEM INDUSTRIES

M/s. Shreeji Colourchem Industries, manufacturers and exporters of H Acid, has recently shifted to a new premises at Oriental Bank Bldg., Office No. 11-B, 2nd Floor, 65, Mahatma Gandhi Road, Bombay 400 023. Phone: 275916.

Hari Om Ashram Award: 1989

ATIRA Foundation has the privilege of awarding the prestigious Hari Om Ashram Award since 1975. This is one of the several awards instituted by the Ashram at Nadiad, Gujarat and is given annually for outstanding scientific or technological contributions in textile sciences.

Out of the eleven contributions received for the award for 1989, two have been judged to share the award equally. The two recipient scientists are:

* Dr. H.T. Lokhande, Prof. of Fibre Chemistry, Department of Chemical Technology, University of Bombay, for his work in three areas:
  1. Increase in the knowledge of fine structure of cotton and other fibres,
  2. Novel achievements in textile processing techniques,
  3. Grafting and electrokinetic studies of fibres.

* Dr. N.D. Sharma, Principal Scientist and Head of Sir Padampat Research Centre, Kota, Rajasthan for manufacturing process for synthesis of dimethyl ester of 5-sulphoisophthalic acid (monosodium salt).

Each recepient of the award gets a cash prize of Rs. 3,500 alongwith a citation.

Dr. H.C. SRIVASTAVA AWARD

To felicitate Dr. H.C. Srivastava, Senior Deputy Director and Head of the Chemistry Division on his 60th Birthday in 1986, his students and wellwishers raised a 'Dr. Srivastava Felicitation Fund'.

This fund was donated to the ATIRA Foundation to institute an award once in two years for the best work in textile chemistry and chemical technology. The foundation decided to implement the award scheme effective from 1989. Five contributions were received for the 1989 award.

The first 'Dr. H.C. Srivastava Sixtieth Birthday Felicitation Fund Award' has been won by Dr. N.D. Sharma, Principal Scientist and Head of Sir Padampat Research Centre, Kota, Rajasthan. His contribution on "Manufacturing Process for Flame-Retardant Acrylic Fibre" has been adjudged the best. Dr. Sharma receives a cash prize of Rs. 5,000 and a medallion.

HPCL ENVIRON MONITORING STATIONS

The Chembur refinery of HPCL has installed three environment monitoring stations, valued at Rs. 1 crore for monitoring SO_2, NO_x, CO and du particles.

Installed by Toshniwal Brothe (Bombay) Pvt. Ltd., each station co sists of microprocessor based contin ous monitors. The three stations a hooked to a central computer whi continuously analyses the data and giv output such as continuous readings, ti weighted averages and peak levels terms of value percentages and dir values.

The system is imported from Env ronment S.A. of France, to continuous monitor atmosphere around HP refinery for hazardous gases, and enable it keep the emission levels wit the limits prescribed by the Central a State air pollution control norms.

AEGIS CHEMICAL IND.

Aegis Chemical Inds. despite increase in net sales to Rs. 11.62 cro from Rs. 10.57 crores, suffered a fall its gross profit to Rs. 97.83 lakhs duri the six-month period ended Septemb 1989 from Rs. 109.08 lakhs in the sa period last year.

With an increase in depreciation Rs. 78.56 lakhs from Rs. 63.87 lak the net profit has slumped to Rs. 19. lakhs during the period from Rs. 45. lakhs in the previous period.

PARAXYLENE PRICE MAY BE FIXED AROUND Rs. 18,500

The fair selling price for indigenously produced paraxylene is likely to be fixed around Rs. 18,300 to Rs. 18,500 per tonne on the basis of a detailed report submitted by the cost account branch (CAB) of the Union Finance Ministry. CAB was asked to make a cost study and recommend a fair selling price for the product, which is a basic raw material for the production of DMT and PTA. IPCL and Reliance Industries are expected to be the major suppliers of paraxylene in the country after meeting their captive requirement, while Bombay Dyeing, which was solely dependent on imported paraxylene, will be the single largest consumer of the locally produced material.

CAB had undertaken the study on the recommendation of the chemicals and petrochemicals department, and after making a detailed study on the cost of production of paraxylene by IPCL, Bongaigaon Refineries and Petrochemicals Limited (BRPL) and Reliance Industries, it has submitted the report to the Finance Secretary a few days ago, according to reports reaching Bombay from New Delhi.

Earlier, BICP had conducted in Feb. 1986 an in-depth assessment of fair selling prices of DMT produced by IPCL, BRPL and Bombay Dyeing. With an input price of paraxylene ranging between Rs. 10,000 to Rs. 11,500/tonne for the DMT producers, BICP was reported to have recommended a fair selling price of Rs. 17,088 per tonne of DMT for IPCL, Rs. 20,484 for Bombay Dyeing and Rs. 25,055 for BRPL.

The reason for the different levels of fair price is the difference in the cost of production arising from the varying age of the plants. IPCL's plant is very old and virtually written off. Bombay Dyeing had installed a second hand plant in 1985, and while both these plants had very low investments, BRPL's plant was a brand new set up in 1985 at a huge cost.

I.C.M.A. Awards 1989: Nominations invited

The Indian Chemical Manufacturers Association invites nominations on or before Saturday, the 24th February, 1990 for the following Awards:

* I.C.M.A. Acharya P.C. Ray Award for Development of Technology Indigenously.
* I.C.M.A. Award for Process Design and Engineering of Chemical Plants.
* I.C.M.A. Award for Novel and Complex Technology for the first time in India having a widespread impact on Chemical Industry and Economy.
* I.C.M.A. Award for Environmental Control Strategies and Safety in Chemical Plants.
* I.C.M.A. Award for Novel Energy Conservation and Integration Programme in Chemical Plants.
* I.C.M.A. Award for Export of Chemical Products/Chemical Plant/Engineering Services Rendered Oversea[s]
* I.C.M.A. Award for Innovative an[d] Purposeful Programmes for Socia[l] Progress.

For all the Awards, Chemic[al] Industry will be taken to embrace an[y] of the items manufactured in th[e] chemical sector including organic an[d] inorganic chemicals, pharmaceuticals, dyestuffs, fertilisers, pesticides, man-made fibres, speciality chemicals o[r] other chemical products. To be eligible, nominees need not be a membe[r] of the I.C.M.A., and the industrial uni[t] may be either in the public or in th[e] private sector.

Further details and forms of nominations could be had from the offices of the Association at Bombay, Delh[i] and Calcutta.

llution control technologies highlighted

e Association of Small and ium Chemical Manufacturers had ged a half day seminar on "Water Air Pollution" in Bombay recently. M.L. Mirashi, Chief Inspector of ories, Maharashtra was the Chief st at the function.

ddressing the audience Mr. Mira-oted that recent modifications to the ries act had been necessitated to ove the feeling that risk prevention e work place was a responsibility outside policing agencies. These lifications put the responsibility rely in the hands of the manage-t who are required to identify rds at the work place and take er steps to minimise them. While hazards need to be taken into ount at the design stage itself Mr. ashi called for detailed disclosure of rmation regarding processes carried , materials employed, and onsite rgency plans to the concerned ployees.

He noted that several problems which se in the private premises of the fac-y do go beyond the immediate vicin-s of the premises, and in cases may n cross state and national boundaries.

Shri K.M. Mehta, Member, Pollution ntrol Board, Maharashtra, who aired the technical session, mooted setting up of common pollution con-l facilities to collectively treat indu-ial effluents coming from several lustrial units. While initial processing the waste streams could be done at h unit, subsequent processing prior discharge in the environment could carried out collectively. While one ch unit had been set up under private trepreneurship in Hyderabad, the ujarat Industrial Development Corpo-tion (GIDC) is going ahead with sim-r plans. One such common effluent atment facility is also being set up to at tannery effluents in the North rcot district of Tamilnadu. While some embers expressed reservations regarding the pin-pointing of responsibilities in case of environmental abuse, most members attending the seminar felt that such common facilities were the path to take.

Pollution prevention

In a paper on "Prevention of Water Pollution arising from Chemcial Process Industries" Prof. S.B. Chandalia, Department of Chemical Technology, Bombay University, provided a summary of End of Pipe (EOP) pollution control measures as also the role of preventive measures.

Emphasising the need to shift from control to prevention Prof. Chandalia noted that emphasis should be placed on eliminating wastes "Upstream" where they are generated rather than providing expensive pollution treatment plants "downstreams", by the modification of existing technologies or introduction of new technologies. Examples include:

* modification of the Solvay process ensuring recovery of calcium chloride from the waste stream by converting into ammonium chloride.
* reduction of nitro compounds by catalytic process using hydrogen instead of the conventional iron-acid systems.
* phenol production from cumene oxidation in air, versus the earlier alkali fusion of chlorobenzene or benzene sulphonic acid.
* membrane cell technology for caustic soda production eliminating the problems associated with mercury cell usage.

In all future development work, Prof. Chandalia felt, it would be a sound policy to consider pollution abatement as an integral part of the process. No technology should be considered worthy of being evaluated for possible commercial adoption, unless it has resolved environmental problems in an acceptable manner in the light of the current standards laid down by the various statutory control authorities. It may be economically disastrous to implement a commercial plant first and subsequently try to resolve the pollution problems and realise that no acceptable solution is within sight, he felt.

Computer assisted risk assessment package

Dr. Prasad Modak, Assistant Professor, Centre for Environmental Science and Engineering, IIT, Bombay, in his paper highlighted the essential features of a package developed at the Institute for quantitative risk assessment.

This package has a host of relevant databases, as oriented to chemical industries and includes layout planning routines for minimisation of the risk. The effort is to make a stand alone distribution package for risk assessment to achieve the following.

1. to hasten the chemical of industrial clearance and to make decision on clearance on more rational basis.
2. to assist the regulatory authorities, planners and designers to investigate the plant accidents (e.g. fire, explosion and toxic releases) and predict the possible consequences for decision making.
3. to remodify the layout and identify safety measures to be undertaken within the industry, so as to minimise the onsite economic damage as well as offsite risks to the society and environment.
4. to rank the plant layout based on the hazard potentials.

Outline of package

This computer package on risk assessment, acronymed as MinRisk, estimates risks for specified plant layout and allows reorganisation of layout to minimise the risks in an interactive mode.

The chemical industry is visualised herein as consisting of various clearly identifiable "units". MinRisk then quantifies the economic damage and individual risks, associated with each of

(continued on p. 52b third column)

Ban on export of 16 bulk drugs likely

The Government has identified shortages of 16 bulk drugs and their formulations and is looking into the possibility of banning their exports.

This follows representations made by the North India Small Drug Manufacturers Association. Senior officials and industry representatives attended a meeting held by the Department of Chemicals and Petrochemicals to discuss the issue.

The following are the 16 bulk drugs: Tetracycline hydrochloride, oxytetracyline hydrochloride, rifampicin, chloroquin phosphate, Analgin, Vitamin B1, Vitamin B2, Vitamin C (Ascorbic acid), paracetamol, pyrazinamide, pyrodoxine HCL, ethambutol hydrochloride, thiamine hydrochloride, chloramphenicol, oxyphenbutazone and caffeine.

Apparently, no decisions were taken at the meeting. Manufacturers' representatives admitted to the shortage and expressed the fear that it will worsen in the coming months as the Government had frozen all price increase okayed by BICP after studying the cost data. They pointed out that the official price for several bulk drugs were actually below the cost of production.

A good example is chloramphenicol. According to producers, the cost of production comes to almost Rs. 1400 a kg. Now that the Government is threatening such units with prosecution for overcharging, production is bound to suffer and shortages will worsen. Paracetamol is another example. There is no price control on PHCB, the main raw material. The chemical is rationed out by the producer and open market quotations are prohibitively costly.

Paracetamol bulk is officially priced at Rs. 115 a kg. However, formulators have to pay more than Rs. 160 a kg. for making their tablets. Half a dozen products in the shortage list are those made by the public sector Indian Drugs and Pharmaceuticals Ltd. (IDPL). In many other products, arbitrary actions on the part of the Government have contributed to shortages. Pyrazinamide and rifampicin are in short supply for this reason.

Pyrazinamide price has been arbitrarily slashed. Equally macabre is the decision to shift 3-formylrifampicin, the intermediate to make the anti-TB, anti-leprosy drug rifampicin, to appendix III-A, making imports difficult. The action is strange because there is no indigenous manufacturer of 3-formylrifampicin in the country. Industry sources say the vital anti-TB, anti-leprosy drug will be in short supply in another three months unless the Government reverses its decision.

The tragedy is that officials are on the side of industry, knowing fully well that price increases allowed by BICP are in fact reimbursement of cost increases in raw materials already incurred. However, the new Minister, Mr. M.S. Gurupadaswamy, is yet to appreciate the issue.

Indeed, some exasperated souls in the industry ask why not scrap DPCO if its provisions are not followed and what is due to the industry as per law is denied on whimsical grounds.

A glaring example is loan licensing. The Government had appointed a high-level panel headed by Dr. Premkumar Gupta, Drug Controller of India, which had recommended continuation of the system till 1993.

Senior officials of the Government had openly told those in the industry that the recommendation had been accepted and was to be notified soon. However, the Minister, addressing a meeting of chemists in Bangalore recently, made it clear that the issue has to be reconsidered.

The last few years have seen no fresh investment in pharmaceuticals but expansion of existing units. Fina institutions are not keen on assistin industry because of its poor profitab The Government has projected a gr from Rs. 4,000 crores turnove Rs. 16,000 crores by the turn of the tury. Where will the money for massive investment come from, tho the industry ask.

The industry is treated like any o industry though numerous controls clamped because it serves the ai public. But the industry has to r money like any other industry, pay workers similar wages and investors not ready to forego dividend becaus the nature of the industry, it is poin out.

(continued from page 52a)

the unit of chemical industry due to f explosion and toxic releases. The ec nomic damage is quantified in terms Maximum Probable Property Dama (MPPD) while the individual risk is units can then be optimised in terms other information in the neighbourho area so as to minimise both MPPD well as FAR.

MinRisk is under continuous dev lopment and many more features a expected to be added in the near futu For example, scenarios for steady lea from the chemical and storage equi ment, options for parametric analys and risk computations under probabili tic conditions are some of the identifi extensions.

Importantly, it is proposed to revie the basic model of MPPD and FA more thoroughly by requesting pe reviews and conduct evaluation fro experts.

Dr. P.V. Arun, General Manag (Technical Services), Hindusta Organic Chemicals Ltd., in his presenta tion highlighted the experience of hi multi-product company in effluen treatment and pollution control.

Ban on alcohol export sought

The Indian Chemical Manufacturers Association has sought a total ban on the export of industrial alcohol given the poor availability of this vital raw material in most parts of the country. Anticipating a short-fall of 67 lakh litres during 1989-90 the association has noted that various units producing chemicals from industrial alcohol and other industries like drugs and pharmaceuticals which depend on alcohol-based chemicals are likely to suffer seriously.

With investments of about Rs. 300 crores in the industry producing a range of chemicals like acetic acid, acetic anhydride, vinyl acetate, polystyrene, glyoxal, butane, ethylene glycol, etc. the industry has spread far and wide generating employment to a large work force. The Association has called for the following steps to stem the rot spreading in the industry:

* Fuller utilisation of all molasses including that from Khandsari makers. The Association has suggested the formation of state level bodies to ensure collection of molasses from Khandsari makers. Todate no proper collection of this potentially vital raw material exists. With higher alcohol recovery possible from Khandsari molasses ICMA feels that the production of alcohol could be enhanced appreciably by using all the molasses.

* Uniform pricing for Industrial alcohol, making interstate movements of alcohol free of levies, and ensuring availability to all consuming industries at prices, competitive to petroleum feedstocks. While the supreme court has termed the levy of taxes like the transport fee, vend fee and sales tax by the state governments as illegal and invalid most states are yet to implement the order. Maharashtra is the only state to have done away with the transport fee of 50 paise per litre but has introduced an "administrative fee" of 20 paise per litre of alcohol.

* Priority for allocation of alcohol for industrial as against potable purposes. While states like U.P., Maharashtra and Tamil Nadu have been giving preferences for allotment to industry, in most other states very high allocations to the potable sector have starved existing chemical units of alcohol supplies.

The Association has urged the government to allocate alcohol obtained from molasses preferably to the industrial sector, and encourage potable liquor manufacturers to seek non-conventional starchy materials such as tapioca, potato, beet-root etc. as a source of their alcohol.

The association has called for a National Policy on Alcohol, incorporating the above features, to ensure the healthy state of alcohol based chemical industries.

CRUDE OUTPUT MAY FALL SHORT OF TARGET

The crude oil production and exploration in the Seventh Plan is likely to fall short of the target, according to latest estimates made by the petroleum ministry.

These estimates show that actual production of crude oil during the Seventh Plan period is expected to be 157.38 million tonnes against a target of 160.01 million tonnes.

The Oil and Natural Gas Commission is estimated to produce 144.51 million tonnes against the target of 143.64 million tonnes. Oil India is estimated to produce 12.87 million tonnes against a target of 15.50 million tonnes.

Substantial shortfall is expected in exploratory drilling for oil and gas. The total exploratory drilling is expected to be 2.14 million cubic metres against a target of 2.82 million cubic metres.

Both Oil and Natural Gas Commission and Oil India will be falling short in exploratory drilling. The shortfall is mainly attributed to delay in acquisition of rigs. Other factors include loss of man-days due to bandhs and floods in the north-eastern sector of the country.

However, the current year's crude oil production target of 34.31 million tonnes is expected to be achieved. The next year's production target is being kept only marginally higher than this year's production level.

The crude oil production target for 1990-91 is being fixed at 35.9 million tonnes. The production potential for natural gas is expected to go up to about 60 million cubic metres a day next year. The production potential this year is estimated at 40 million cubic metres per day. About 30 per cent of the gas produced in the country is flared due to lack of utilisation facilities.

Efforts are now being made to reduce flaring of natural gas in the coming years by changing its use pattern. The broad use pattern of gas during the last five years has been that about 45 per cent of the gas has been used by the fertiliser industry, 35 per cent for power generation, 17 per cent for internal use including shrinkage and the balance of about three per cent as an industrial and domestic fuel. Over the past few years a number of commitments have been made for the power sector and some more are likely to be made.

PLASTINDIA-'90 FROM MARCH 1-7

An international plastics exhibition and conference, is being organised by Plastindia Foundation from March 1-7, 1990 in New Delhi.

According to a Plastindia-'90 press release, the basic objectives of this unique, major fair is to show the high relevance of plastics industry in Indian economy, with emphasis on exports and technological upgradation.

Producers asked to indicate paraxylene availability

The Petrolreum and Chemicals Ministry has asked the domestic producers of paraxylene to indicate on a firm basis by the first week of February the amount of paraxylene that would be available for sale in the market by them next year. Simultaneously, the consumers of paraxylene have also been asked by the ministry to indicate their demand for next year.

This follows the high level discussions in the government during the last few days to determine the tariff protection and import requirement for this raw material used for manufacture of PTA and DMT and the fair selling price for it which has been a subject of heated controversy involving the government for the last few years.

A plan for assured supply of this raw material for 1990-91 is now being drawn up by the ministry taking into account the demand. Rough estimates made by the Petroleum and Chemicals Ministry have shown that about 50,000 tonnes of paraxylene may be required to be imported next year to meet the demand.

Though the capacity and surpluses available with the Indian Petrochemicals Corporation Limited (IPCL) are known, the same is not the case about Reliance. The ministry has, therefore, thought it better to ask all producers to indicate how much paraxylene would be available next year for sale after taking out their captive consumption.

At present imports of paraxylene are canalised through IPCL. Imports are however, permitted only if the domestic availability is not there. During the current financial year, IPCL has so far imported about 37,500 tonnes of paraxylene for domestic sale and it is felt that only small quantities of imports may be required during the remaining part of the financial year. This is because Bombay Dyeing, which according to one estimate, requires about 43,000 tonnes of paraxylene this year, is taking a shut down of about three weeks in March next.

Bongaigaon Refineries and Petrochemicals Limited, another producer of DMT and paraxylene has also had to buy about 2,800 tonnes of paraxylene for its use from IPCL this year.

However, next year BRPL is likely to require about 4,800 tonnes of paraxylene since its production of DMT is planned to be increased. The production of DMT by BRPL fluctuates depending on the availability of naphtha which partly comes from its own refinery and partly from the Guwahati refinery. IPCL has recently expanded its capacity for manufacture of paraxylene and will have a surplus for merchant sale next year. The production of paraxylene by IPCL will go up from 17,000 tonnes to 31,600 tonnes next year.

The corporation would require about 21,000 tonnes of paraxylene for its own consumption and rest of the 10,600 tonnes would be available for sale. This surplus would, however, be available only in small quantities initially since it would take IPCL sometime to achieve its full capacity.

Reliance has this year made available about 7,000 to 8,000 tonnes of paraxylene for sale. Coupled with the availability, is the question of arriving at a fair selling price for paraxylene. In the past, indigenous paraxylene has been sold at the landed cost of imported paraxylene which was estimated by BICP to be double the cost of indigenously produced paraxylene resulting in huge profits for domestic producers.

Another complaint has been that the level of tariff protection for paraxylene was deliberately kept at a high level. BICP in its report submitted to the government in December 1988 had said tha no protection was required by th domestic industry at the then prevailin international prices. However, sinc there was a premium on foreig exchange, a duty of 25 per cent shoul be levied on imported paraxylene. BIC had also recommended that imports o paraxylene should be put on OGL.

However, since the submission of th BICP report there have been changes i the international prices and new cap city added by IPCL. The capital cost new capacity is claimed to be mu higher though IPCL also claims its ne process is much more efficient than t old one. The cost accounts branch of t Finance Ministry has taken up a stu to determine the fair selling price paraxylene. It is expected that the sal of paraxylene next year will be made the basis of the conclusions drawn this study. The tariff protection to offered to domestic industry for pa xylene, DMT and PTA would a depend on the results of this study.

COPPER, ZINC, NICKEL PRIC REDUCED

The Government's inter-ministe committee has reviewed Mineral Metal Trading Corporation's (MM selling prices of non-ferrous metals news note issued by MMTC on Fe said the prices had been fixed for period commencing February 1. prices fixed for the various metals as follows: electrolytic copper Rs. 81,000 per metric tonne (p copper cathodes Rs. 77,955, continu cast copper wire rods Rs. 87,500, e trolytic HG zinc Rs. 48,000, special zinc Rs. 48,200, pig lead 99. Rs. 29,500, pig lead 99.9 Rs. 29,700, tin Rs. 2,97,000, ni sqrs/briq./pellets Rs. 3,55,000 nickel strips/F. shots Rs. 3,58,000. news note said the prices were godown for sale from all M godowns excluding sales tax and o which were extra at actuals.

all to promote brands in world leather market

ıdian manufacturers and exporters eather were told to pay attention to ge building and brand promotion in world market. In his inaugural ress to the India International ther Fair 1990 at Madras on Janu- 31, (read in his absence by Mr. S.P. kla, Union Commerce Secretary), Arun Nehru, Union Minister of nmerce and Tourism said, "I am appy that this has still remained our kness resulting in a rather modest gress in production promotion. The that our share in the world market nly three per cent leaves ample room an Indian brand name to take its ignated place in the world trade".

He called upon the manufacturers and orters to take full advantage of the ort promotion programmes and the nmercial establishments in Indian ssions abroad. Assuring Governments port to the leather trade's export ve, Mr. Nehru said it was addressing elf to constraints like limitations of go clearance capacity, congestion at ports and voluminous export documentation. He wanted the organised ctor to support the Government initiates for establishing effective linkages th the primary producers in product nsformation and in the process of aining higher value advantages in the oduct.

ay attention to costing

Advising exporters to pay attention to sting of their products to be internanally competitive, he wanted them to udy the internationally acceptable odels carefully in respect of each cost ement.

In his address, Mr. Shukla said that e had a detailed and productive meetng with representatives of the leather xport community. Some specific proosals and ideas had emerged and they vould be followed up on a priority basis the weeks to come.

Mr. Shukla also gave away awards in recognition of excellence in export performance to over 50 entrepreneurs from all over the country. The awards have been instituted by the Council for Leather Exports, Madras. To name a few winners of export-promotion awards: Tata Exports, Ponds India Ltd., Sreenivas & Co., T. Abdul Wahid & Co., Adityaa Leather Exports and Farida Prime Tannery.

Mr. M.M. Hashim, Chairman, Council for Leather Exports, said that the Ministry of Commerce and the Council were working as partners to give a boost to leather exports. He requested the Tamil Nadu Government to allot a permanent site for holding the leather fair.

Mr. K.V. Rajan, Chief General Manager, Trade Fair Authority of India (TFAI), welcomed the gathering. Mr. V.D.N. Rao, TFAI General Manager, proposed a vote of thanks. Leather and sophisticated leather products, besides machinery are being exhibited at the fair by 100 foreign and 159 Indian companies.

Earlier at a press conference it was pointed out that the fair this year is planned on a much larger scale than in the previous years in terms of participation, display area and product coverage. Of the 257 participants, nearly 100 are from abroad and the rest representing the domestic industry.

The foreign participants include well-known names from the UK, West Germany, Czechoslovakia, France, etc. Italy is taking part in a big way with as many as 54 firms coming under the umbrella of Italian Trade Mission. The French participation will be under the banner of French Trade Mission and includes 13 leading companies.

The focus in the foreign section will be on sophisticated machinery and equipment for applications in tanning, finishing, cutting and manufacture of leather products. The exhibit profile of the domestic section will range from semi-finished and finished leather to footwear, components, travelware and fashion accessories.

Plea for permanent site

The Trade Fair Authority of India and the Council for Leather Exports have renewed their plea to the Tamil Nadu Government for allocation of a permanent site for trade fairs in the city.

The appeal comes in the wake of the realisation that Rajaji Hall, the present venue for the international leather fair being held at Madras annually, has become too small to accommodate the growing number of participants year after year.

A measure of the increasing popularity of the fair, both at home and abroad, can be had from the fact that from a mere 100 participants (80 domestic and 20 overseas) in 1986, the number has gone up to 257 (157 and 100) this year. The area of display has also moved up in tandem, from 1800 sq. mt. to 6000 sq. mt.

Talking to newsmen at Madras recently, Mr. M.M. Hashim, Chairman, Council for Leather Exports, brushed aside suggestions of a possible shifting of the fair outside Madras from next year for want of a suitable venue. He asserted that the fair should continue to be held in Madras given its prime position in the leather map of the country.

A permanent site, complete with a modern convention centre, could be used not just for the leather fair but for several other similar events slated to come to Madras, he added.

Besides, the fair provides for the many small entrepreneurs, who cannot afford to go abroad, an opportunity to acquire firsthand knowledge of the modern trends in leather manufacture, he added. The first three days of the fair is reserved for business visits and the last day is open for public.

DIRECTORY OF INDIAN PROCESSED FOOD AND ALLIED INDUSTRIES

The Central Food Technological Research Institute (CFTRI), Mysore will be shortly releasing the above Directory. Included in the Directory are: list of over 4000 major food processors/exporters in the area of fruits, vegetables, bakery and confectionery, dairy, fish, meat and poultry, additives, packaging, etc.

Additional information includ Food Laws and Regulations; fin license and quality control age training organisations; R & D age and other development agencies Directory is divided into six major i.e. (1) Processed Food Industrie Allied Industries, (3) Exporters Industrial Production and Regul Agencies, (5) Indian Food Laws, ulations and Specifications anc Appendices.

This 752-page Directory is an luable and indispensable guide to processors, traders, exporters and o who wish to have an overview o food processing sector. For easy r ence, the entries are arranged alph ically giving name of the man turer/exporter, address, products (names), phone numbers and telegra code. An Index giving informatio range of products, flavours and addi available in the country adds furth its usefulness as a comprehensive r ence guide.

Price is Rs. 500 plus packing postage (Regd. Post) Rs. 25. Copie be had from the Sales and Distrib Officer, FOSTIS, CFTRI, Mysore 013. D.D./M.O./Cheques should in the name of Director, CF Mysore. Outstation cheques sh include Rs. 10 extra towards charges.

IIChE seminar on speciality chemicals

Indian Institute of Chemical Enginers, Pune Regional Centre, in collaboration with Materials Research Society f India is organising a one day seminar on 'Performance Chemicals and Materials: Technology and Business' at une on 10th March 1990. The purpose f this seminar is to highlight, the recent dvances, present and future applicaons and business opportunities in the eld of Performance Chemicals & Materials. It is intended for R & D and narketing managers, corporate planers, and project personnel in the chemcal industry.

The Indian Chemical Industry is kely to face problem of over-capacity nd consequent production slow down uring the nineties. The only way to vercome this situation is to move ownstream into value added speciality hemicals and materials that perform. he shift in business from commodities o performance chemicals and materials (PCM) has been taking place gradually over years in the industries.

Companies in the U.S., Europe and Japan have made swift strategic moves in this direction. Performance chemicals and materials account for 50 to 75 per cent of the earnings of chemical giants such as Du Pont, Dow, Monsanto, Union Carbide, Hercules and like. This phenomena is inevitable in India too, and Indian chemical firms are looking out for opportunities in this sector.

The topics to be discussed at the seminar will include adhesives, polymer additives, electronic chemicals, functional dyes, speciality fibres, high performance ceramics, membranes and composites. A separate session will be devoted to marketing and technical services aspects and venture capital financing for this sector of the chemical industry.

Eminent experts from industry, R & D organisations and Government departments will deliver the lectures in areas of their specialisation.

For more details contact: Mr. H.G. Joglekar (Hon. Secretary), IIChE (PRC) Division of Technical Services, National Chemical Laboratory, Pashan, Pune 411 008. Gram: CHEMISTRY (Pune). Telex: 0145-266/530/653. Tel.: 337860.

AWARD FOR EXPLOGEL

Explogel India has bagged the "District Award 1989" for its import substitite item guanidine nitrate. The company exported its first consignment to Hungary and earned foreign exchange worth $1,16,000.

During 1990, the company has got export orders for guanidine nitrate worth Rs. 1 crore from Medimpex and is expecting other orders worth Rs. 3 crores from Western countries also.

MODERNISATION OF DISTILLERIES

Techno-economic evaluation urged

The two-day national seminar on "Modernisation of conventional Indian distilleries based on molasses," organised by the Vasantdada Sugar Institute (VSI), formerly known as the Deccan Sugar Institute (DSI), at Manjari, Pune district recommended on the concluding day that techno-economic evaluation of distilleries which have adopted the continuous fermentation process should be taken up and care should be taken that the technology adopted for improving efficiency of present batch type distilleries is of minimum cost.

It was noted that selection of proper strains of high sugar, high alcohol and high thermo-tolerant yeast was a must for better fermentation efficiency and the conversion of starch directly into suitable strains of alcohol must be developed by methods of genetic manipulation. It was stressed that proper technology which reduces energy requirement of distilleries should be considered for adoption. It has recommended the setting up of more alcohol based chemical units like ethylene oxide and mono-glycol products and also that all efforts should be made to raise capacity utilisation which is now only about 65 per cent.

Regarding effluent treatment, the seminar has recommended adoption of available and appropriate technology including recovery of energy and manure. It was however suggested that the industry should be given time for absorbing technology which suits local conditions. It also suggested that government should consider giving financial incentives to combat the high cost of setting up effluent treatment plants. Over 200 delegates attended the seminar. Inaugurating the seminar, Mr. Shivaji Rao Patil, chairman of Maharas tra Rajya Sahakari Sakhar Karkhan Sangh said that in the last three yea distilleries in the country were facin problems and closure mainly due to a unreasonable tax policy regarding alc hol and molasses, as also the closure o one large alcohol based chemical un and the non remunerative price of alc hol. He however added that "a star o hope" was rising in the horizon, refer ring to SM Dyechem Ltd's offer o financing modernisation of existing dis tilleries with a buy-back arrangement o alcohol produced — and hoped that th alcohol industry will look up very soo

Mr. Patil pointed out that capacit utilisation of distilleries which had a installed capacity of about 1530 millio litres against production of about 80 million litres of alcohol by 194 distil leries based mostly on molasses wa hardly 65 per cent. This was in spite o the fact that the alcohol industry ha provided excellent support to the suga industry and also helped develop the organic chemical industry.

Mr. Patil therefore urged that distilleries should adopt latest technology like biostil for conversion of presen batch type process to continuous fermentation process. Mr. Patil remarked that compared with the average yield of 220 litres per tonne in India it was around 300 litres per tonne of standard molasses in Brazil and Kenya because industries in these countries had opted for modern technology.

The distilleries in India which had adopted modern technology had not only raised the average yield but also improved the quality of alcohol which was necessary for alcohol export. Better quality alcohol was more acceptable by industries needing alcohol for potable purposes. Mr. Patil also referred to the cost of steam which formed a major constituent in cost of production of alcohol. He felt there would be no need for distilleries to buy fuel from outside as energy could be generated from

spent-wash. Referring to the problem of effluent disposal, Mr. Patil revealed that experts who have toured the world for an appropriate technology for effluent treatment had returned disappointed because there was no one method which was fool-proof.

Mr. Patil pleaded that the government should give more time for the industry to develop economical and effective methods for the secondary treatment of the methanisation process and until then a bod level of 2000 ppm should be allowed. "If this is done many distilleries will accept methanisation as a proper method of effluent treatment," he stressed. Mr. Patil referred to the method of compositing spent-wash to bio-earth which is considered to possess fertiliser value. This process needs proper development to ensure proper degradation of spent-wash, he said. Mr. Patil emphasised in this connection that government should encourage these efforts by providing funds and incentives for modernisation of conventional distilleries to enable the industry to draw up short term and long term programmes for effective implementation of modern concepts in existing units. Mr. S.G. Kolhe, chairman of the study group on food processing of the government of Maharashtra and chairman of Sanjivani Sahakari Sakhar Karkhana Ltd. emphasised that distilleries could operate efficiently if the huge quantities of molasses produced by sugar factories were fully consumed. Mr. Kolhe cautioned against accepting a technology which had not been proved abroad as companies can ill afford to liquidate capital stock for adopting a technology of doubtful value.

Dr. D.G. Hapse, director of VSI pointed out that a decision on modernisation of distilleries which would cost about Rs. 60 lakhs will have to be taken in the background of a production of 40 lakh tonnes of molasses a year in the country. Whereas this would yield 880 million litres of alcohol by employing the conventional batch process the continuous fermentation process would raise this to 1100 million litres which can meet the demand of alcohol based industries like SK Glycol Ltd., a division of SM Dyechem which will be producing downstream products like monoethylene glycol and ethylene dioxide at its unit being set up at Bhare village near Pune. Prof. T.K. Ghose, renowned biotechnologist at the Indian Institute of Technology (IIT) in New Delhi stressed that sugar cane can be the nucleus for growth of industries connected with agriculture and animal husbandry. Both Dr. Ghose and Dr. S.C. Basappa, of CFTRI of Mysore suggested that bagasse can be used to grow edible mushrooms. Prof. H. Veermani of IIT, Bombay summing up the deliberations said spent-wash should be looked upon as feedstock to produce methane gas.

CALL TO PROMOTE BIOGAS TECHNOLOGY

The International Biogas Conference, held at Pune in January has recommended that national governments should provide political framework for promotion of biogas technology as it (technology) has proved to be an important stimulant for a comprehensive approach to a long-term integrated development process.

Worldwide experience has indicated multiple benefits of biogas in relation to public health, employment generation, energy, fertiliser, environmental protection and removal of women's drudgery.

The role of international aid agencies and industralised donor countries is crucial in view of resource constraints in many developing nations, the conference felt and recommended that outstanding debts of the developing countries to one donor agency should be converted into aid as an incremental addition to the existing biogas programme.

Paint units seek excise relief

The Indian Small Scale Paint Association has asked the Union Finance Minister to increase excise exemption limit from Rs. 15 lakhs to Rs.50 lakhs and revert to the earlier duty of 15.75 per cent.

In a memorandum submitted to the Minister Mr. Savai Sheth, President of Indian Small Scale Paint Association stated lack of encouragement from the Government had put the SSIs in shambles and they did not enjoy the economies of scale that the large sector enjoyed nor the technological advantages. However, there are over 2,000 SSI units accounting for 50 per cent of paints production, Mr. Sheth pointed out.

Referring to the availability of raw materials at reasonable prices, the Association President made a fervent plea for the reduction of import duty on titanium dioxide from the present level of cent per cent to 45 per cent. Stating that this is a critical item in manufacture of paints by the SSI sector, it was pointed out that the indigenous manufacturers like Kerala Minerals and Metals Ltd. and Travancore Titanium Products Ltd. hiked their prices in order to cover up their inefficiency.

In 1989, the basic price of titanium dioxide went up by 100 per cent compared to a 30 per cent increase in international price.

By reducing the import duty on this item, the SSI sector could really compete with quality paints at reasonable prices, the President said. Mr. Sheth pleaded for restoration of total exemption from excise for units manufacturing goods without aid of power and also special excise concession for premiers under notification no. 220/77. The latter concession was withdrawn from March 1, 1986. The pre-budget memorandum also urged restoration of payment concessional duty for the SSI sec with respect to branded goods manuf tured for other manufacturers. Th excess capacity in SSI sector could utilised.

It was suggested that full set-off duty be given to consumers buyi goods from SSI which would give impetus for growth.

INDUSTRIAL GAS PLANT UNI TO GO ON STREAM

Sanghi Organisation, a division Sanghi Motors (Bombay) Ltd., is setti up an industrial gas plant manufact ing facility at Taloja, Maharashtra f manufacture of oxygen, nitrogen a acetylene manufacturing plants.

The plant, to be in operation March 1990, will supply these plants various manufacturers on turnkey bas in India as well as in foreign countrie

Mr. Vaibhav Sanghi, Director, say that the potential for this industry is tr mendous, given the growing industr alisation in India and in oth developing nations, worldwide.

He added that the company plans upgrade its technology and increase i plants capacity in line with the trend demand for these industrial gases.

Sanghi Organization will be manu facturing a medium-pressure oxyge plant which will have a unique and eff cient expansion engine which will lowe the operating pressure of this plant a remarkable 60 kgs. which in turn wi not only reduce the plant's power con sumption but also be an added safet feature.

The acetylene plant will be of a advanced design, incorporating sever advanced features not ordinarily avail able from other plant manufacturers present in the country.

Molasses board meeting held

Various issues pertaining to alcohol d alcohol-based industries came up r discussion at the meeting of the Cen-l Molasses Board in New Delhi on bruary 2. The board, which is an apex visory body constituted by the gov-nment, has representatives of various ite governments and segments of gar, distillery and alcohol-based emical industries. The board makes ocations of molasses and alcohol m surplus states to deficit ones.

The consuming industries are happy th the present policy which came into fect in September 1987. The All India cohol-based Chemical Industries ABIDA) has urged the authorities to ntinue the policy. Currently, the ICP is examining the cost of alcohol. e association feels that "while the stilleries must get a fair price, it should ensured at all stages the cost effec-veness of industrial alcohol is main-ined and it is not allowed to be oded."

AABIDA has contended that since olasses is a by-product of sugar, it es not entail any cost except for hand-ng and storage charges. Further, olasses is a pollution hazard and, not ng ago, sugar factories had to incur penditure for getting rid of it. Vari-us expert bodies have recommended at the price of molasses should be kept w so that industrial alcohol continues remain a viable feedstock, according Mr. R. Sivaramakrishnan, president AABIDA.

The association has pointed out that most all the chemicals which are made ut of industrial alcohol can be made om other competitive feedstocks like phtha and methanol.

r.GANGULY, DIRECTOR OF NILEVER, U.K.

Dr. A.S. Ganguly, chairman, Hindu-an Lever, is to be appointed a direc-r on the board of Unilever, U.K. He will be relinquishing his post as chairman of Hindustan Lever by May 1990, and will be succeeded by Mr. S.M. Datta, the present vice-chairman.

In a career spanning 28 years, Dr. Ganguly has held a number of important positions in industry and government bodies. Amongst other posts, he is the chairman of the Indian Institute of Technology, Kanpur.

During his 10-year reign as chief of the country's premier consumer products conglomerate, he saw the company's fortunes sky-rocketing from a turnover of Rs. 380 crores, 10 years back, to cross the Rs. 1000 crore mark last year.

Hindustan Lever's parent company, Unilever, has business interests in India covering a group of seven companies, whose turnover for 1989 was Rs. 2500 crores.

WORKSHOP ON BEAM, PLASMA APPLICATIONS

A three-day national workshop-cum-symposium of 'beams and plasmas applications in materials technology' was held at Bhabha Atomic Research Centre (BARC) Bombay, from February 1. The event was organised by the Plasma Science Society of India and was inaugurated by Dr. P.K. Iyengar, Chairman, AEC.

The main emphasis of the workshop-cum-symposium was on the technological aspects of beams and plasmas and the programme included both invited talks and poster papers on recent research and development work.

The presentations and discussions will serve the purpose of stimulating accelerated R & D in the field of beam and plasma technologies, said an official.

hambal Fert. runs into rough weather

Ir. K.K. Birla, promoter of Cham- Fertilisers and Chemicals Limited CL), is facing problems raising moters' contribution to set up a 764 crores fertiliser plant based on J gas.

Based on a debt:equity ratio of 4:1, share capital is put at Rs. 152.80 res, comprising promoters' contribu- of Rs. 86.40 crores and public par- pation of Rs. 66.40 crores. Mr. Birla rying to enthuse merchant bankers financial institutions to pick up a tion of the promoters' capital under c of the Income Tax Act.

n a status report dated Dec. 31, 1989, company states "it has received lications for allotment of shares to extent of Rs. 47 crores. Besides this company holds commitment to the ent of Rs. 20 crores". It leaves Mr. la to raise yet another Rs. 19.40 es assuming commitment of Rs. 20 es is firm.

After about three years of getting the er of intent, Mr. K.K. Birla, who has ri Agro under his belt, has not been to firm up promoters' equity gh the status report feels the plant come on stream by mid 1992.

The public issue of Rs. 66.40 crores, eduled sometime in 1991, has been erwritten by all India financial insti- ons upto Rs. 46 crores. CFCL has roached commercial banks for erwriting of balance amount of 20.40 crores.

inancial institutions have agreed to vide a rupee term loan for Rs. 300 es, with another loan of Rs. 100.20 es from commercial banks and for- n currency loan from FIs of Rs. 211 es, forming a total debt burden of 611.20 crores.

The company has obtained clearan- from IDBI as the lead institution, ntroller of Capital Issues for the public issue, Reserve Bank of India and MRTP for going ahead with the project.

It is surprising FIs have okayed the fertiliser project despite the sharp changes in retention price scheme (RPS) for new gas-based nitrogenous fertiliser plants with depreciation being cut from 11.88 per cent to 4.75 per cent and norm for capacity utilisation raised from 80 to 90 per cent.

Indo-Gulf Fertilisers, promoted by Mr. Aditya Birla, has written to the Finance Ministry it cannot pay interest on loans taken from FIs owing to changes in RPS. Clearly, the companies and FIs hope to get Finance Ministry alter the RPS in the coming months.

Payments have been made to Snamprogetti, the technical collaborator for the fertiliser unit coming up at village Gadepan, Kota district, Rajasthan. It will produce 1,350 tonnes per day of ammonia on a single stream and 2,250 tonnes of urea per day on two parellel stream basis.

The Centre has dereserved "forest land" for setting up the unit, which was earlier named Aravalli Fertilisers Limited. Environmentalists got the project shifted from Sawai Madhopur delaying the project further. As of date only three fertiliser plants have come up on HBJ pipeline — two in the public sector and one in the private sector.

The tale of Tatas is equally pathetic though last year Tata Fertilisers Limited got merged with Tata Chemicals Limited to bring down the debt:equity ratio to 2:1. Oswals have been offered the Shahjehanpur project which has again been badly stalled. Perhaps in the fertiliser industry, the public sector has done a better job than all the giants of private sector known for their efficiency.

Plastics industry urges new Government to demonstrate its open policy and support SSI & agriculture

Shri Vijay V. Merchant, President, The All India Plastics Manufacturers' Association, Bombay has issued the following statement to the Press.

"It is the first time in the history of Indian Plastics Industry that each and every Association connected with Plastics Industry came together in full force and strongly protested against the totally uncalled for steep duty hike on polymers across the board. AIPMA was priveliged to lead the entire delegation and make a comprehensive presentation to both the new Ministers of Finance and Petroleum and Chemicals about the severe consequence of such a step by the new Government.

The Association has strong belief in the pronouncement of the Prime Minister that **this is an open Government** which would like to be fair enough to big and small and would like to support the small scale industry and agriculture sector sincerely.

Plastics industry feels that the duty hike was most untimely as a dip in the world polymer prices was short-lived and in fact since November 1989 the polymer prices in the world market had already spurted upwards and even at the existing rate of duty almost all indigenous polymer producers would be fully protected during 1990 and would never have any problems in selling their raw materials at fair prices.

Plastics industry feel very much aggrieved that between March 1988 and June 1989 the international polymer prices were at an unaffordable level, 30% to 40% higher than the indigenous prices and the Government did not consider fit to provide relief to 20,000 small scale processing units, despite the fact that several thousand units were becoming sick and could not pay even the interest on loans. A short drop in international prices for 3-4 months between June 1989 and October 1989 have evoked the sharp duty increase which will now widen the gap between local and imported material costs to the detriment of the entire user sector in the country.

It appears that the bureaucrats either reacted too late to the data given to them or have been misinformed by a few with vested interests which will definitely provide a few windfall gains.

This is in fact **an excellent opportunity** for the new Janata Ministry to revoke the decision of imposing additional duties and thereby **demonstrate that it is an open Government** interested in correcting the wrong actions which consequently affects the small scale industry and in turn the masses.

Annexure I will show the widening gap between the landed cost of polymers and indigenous prices which will be inflationary and completely retard the development process of the entire plastics industry in India.

Furthermore, this will also give another serious blow to the supporting industry which manufactures machines, moulds, dies and chemicals for the plastics industry as the sick processing units will not be able to support the related industries leading to depression allround.

We have made a three year study of the rise in the prices of polymers worldwide and in India and each of the four polymers (except one where price pooling average was done); it is clear that the rise in prices had been far greater in India than in any part of the world despite no major cost rise in the input for the Indian petroleum units. If such crisis are created repeatedly with duty changes, the country will miss the opportunity of using the tremendous potential of plastics in raising the li[ving] standards of people both in rural [and] urban sectors, while the neighbou[ring] countries will march ahead.

It is absolutely necessary that [the] Government withdraw these notif[ica]tions first and work out a sensible [duty] rate so that the small scale units [can] grow and at the same time indigen[ous] polymer producers are also protec[ted] and motivated to do better.

The Goverment appears to be giv[ing] wrong signals to small scale indu[stry] and agriculture by such high doses [of] fiscal levies on basic raw materi[als]. Such rude shocks also crush the as[pi]rations of dynamic young entreprene[urs] who have entered the plastics indus[try] with high hopes of using something n[ew] and helping build a stronger and vibr[ant] nation with the use of modern scie[nce] and technology. A Government wh[ich] wants to support self-employment a[nd] motivate new enterprise should respo[nd] quickly and correct what is wrong."

DRUG PRICING UNDER STUD[Y]

The Union Petroleum and Dr[ugs] Minister, Mr. M.S. Gurupadaswam[y] ruled out revising the prices of dru[gs] beyond a limit against the interests [of] the consumers. Participating in the thi[rd] national convention of All India Che[m]ists and Druggists at Bangalore, he sa[id] price control was the answer to e[nd] exploitation of monopoly houses whi[ch] were denying the common man drugs at cheaper costs.

He said a committee of exper[ts] headed by Dr. Bhatty of the Council f[or] Applied Economic Research was st[u]dying the issue of drug pricing. Th[e] Government would consult all organ[i]sations including the All India Orga[n]isation of Chemists and Druggis[ts] before effecting changes in the pric[e] policy. The Drugs Control Departmen[ts] in states should be strengthened f[or] effective implementation of the dru[g] policy.

Annexure I
Computation of landed cost of polymers
Effect of old duties and new duties

		Oct. 1989	Nov. 1989	Dec. 1989	Jan. 1990	Feb. 1990	March 1990
LDPE	$	740	830	880	900	920	950
	Rs.	27000	30197	31965	38000	38848	39820
Indigenous producer price 1/1/90	Rs.				29500	29500	29500
Additional Protection Now	Rs.				8500	9348	10320
HDPE	$	740	785	950	1000	980	980
	Rs.	27666	29625	35845	41553	41093	41093
Indigenous Producer price 1/1/90	Rs.				31000	31000	31000
Additional Protection Now	Rs.				10553	10093	10093
PVC	$	670	680	680	685	700	700
	Rs.	21658	22084	22179	25798	26256	26256
Indigenous Producer Price 1/1/90	Rs.				25000	25000	25000
Additional Protection Now	Rs.				798	1256	1256
Polystyrene	$	850	900	1000	1100	1400	1450
	Rs.	25847	27622	30754	44229	53399	54895
Indigenous Polymer Producer Price 1/1/90	Rs.				37500	37500	37500
Additional Protection Now	Rs.				7729	15899	17395
PP	$	720	760	800	860	860	870
	Rs.	24587	26194	27676	37820	37982	38307
Indigenous Producer Price	Rs.				31000	31000	31000
Additional Protection Now	Rs.				6820	6982	7307

Note: The huge additional protection that will be available to indigenous polymer producers with Notification No. 1/90 and 2/90 and scope for increase of local prices. Normally in the past imported polymer costs were kept Rs. 1500/-, Rs. 2000/- below indigenous prices as imports had other constraints of time and money blocked up for 3 to 4 months. This was accepted by all Indian polymer producers as very fair.

Annexure II
Ready reference of polymer price for 3 year
Changes worldwide

		LDPE	HDPE	PP	PVC	GPPS
March '87	$	600	760	700	560	950
Local	Rs.	21300	21000	20200	18000	29000
December '89	$	880	860	810	680	1000
Local	Rs.	29500	30790	31000	25000	37500
Percentage	$	46.6%	11.31%	15.71%	21.4%	5.26%
Percentage	Rs.	38.49%	46.60%	48.50%	38.80%	29.31%

Between March '87 and December '89 world prices have gone up for LDPE, HDPE, PP, PVC and polystyrene by various percentages.

How Indian polymer producers compare

LDPE: Against 46.6% increase Indian producer increased price by 38.49%
HDPE: Against 11.31% increase - Indian sole producer has increased by 46.6%
PP: Against 15.71% increase - Indian sole producer has increased by 48.5%
PVC: Against 21.4% increase - Indian producers have increased by 38.8%
GPPS: Against 5.26% increase - Indian producer have increased their price by 29.31%

TN polymer makers demand duty cut

Plastics manufacturers in Tamil Nadu have urged the Union government to scrap the hefty additional duty imposed on the import of commodity polymers in view of the crisis the measure has created in the small sector.

President of the Tamil Nadu Plastic Manufacturers Association, Mr. S. Nagarajan, and other office bearers said, that there was no justification for duty hike considering the current "plastic age" and the government's policy to support the agriculture and small sectors.

Following the increase in the duty, notified recently, cost of polymer materials has shot up by 30 to 40 per cent. It will also prompt the indigenous polymer producers to jack up their prices. Some of them have already increased their prices. They complained the duty on five commodity polymers ranged from 160 to 220 per cent whereas it came to 17 to 40 per cent in most of the countries like Taiwan which levies only five to eight per cent.

It would be beyond the capacity of small units to bear the additional landed cost of polymers which came to a whopping Rs. 4,000 to Rs. 18,300 per tonne. Moreover, they would have to pay additional charges and state levies on the enhanced duty. They also noted that the increasing tariff wall had not encouraged the local producers to minimise their production and maintain prices.

The association spokesmen said that the government should desist from increasing the duty on polymers and encourage the small sector to grow at least for the next three to four years by which time the huge capacities sanctioned would be available.

They said that there was already stagnation in domestic consumption of plastic products due to high cost and market resistance. Banks were also not fully meeting the working capital requirements. The situation would worsen with the latest duty hike, they feel. Of the total 20,000 registered small plastic units in the country, there are about 2,000 in Tamil Nadu employing nearly 50,000 persons directly and 1.5 lakh indirectly.

CASCADING EFFECT OF POLYMER PRICE HIKE

It may look far-fetched, but it is bound to happen. Apples and milk will cost more before long following the rise in polymer prices. The average polypropylene crates developed in apple orchards of Himachal Pradesh cost Rs. 95 each. The revised duty on the polymer together with the cascad effect will raise the price to alm Rs. 112 per crate. The Government been keen on promoting the use of pl tics in this sector with a view to c serve wood and avoid deforestation. the crate price was perceived as high, the Government has been prov ing subsidies to the tune of Rs. 5 cro a year from the Oil Industries Dev opment Fund to promote their use.

The latest hike in price will lead an additional burden on the excheq to the tune of Rs. 16 per crate. The t burden for five lakh crates will swel almost of Rs. 60 crores. This is the ex burden to the nation on a single ap cation. Similarly, use of plastic cra for carrying milk sachets was anot officially sponsored idea. One such cr costs about Rs. 55. It will now c Rs. 65 per piece.

The plastic milk sachets themsel will cost more. They are curren priced at Rs. 41.35 per kg., each sac costing 23 paise. The increased in and other costs will now lift the pr to 27 paise per piece.

The annual consumption of th sachets is approximately 30,000 tonn The industry will now have to bear additional burden of Rs. 4.2 lakhs ev day, amounting to Rs. 16 crores year.

World Bank aid for leather research

The leather industry in India is in line for a World Bank loan of Rs. 6 crores. The entire amount will be spent on the leather research in India. Roughly Rs. 2 crores will be spent on developing new leather processing techniques. The chemical processing research will benefit from a similar share. The rest will be absorbed by the footwear sector.

Disclosing this to newsmen at Madras on January 27, Dr. R. B. Mitra, Director, Central Leather Research Institute (CLRI), said that services and technologies offered by CLRI are finding increased use in the country's leather industry.

There has been a 50 per cent increase in the external cash flow of CLRI in the previous year. This comes to around 17 to 20 per cent of the total budget of Rs. 4.8 crores. It is expected to go up to 30 per cent this year, he said. Mr. Mitra was briefing newsmen on the 25th 'Tanners Get-Together' (TGT).

Explaining the significance of the theme and its implication on the future growth of the industry, he said there is a need for evolving a national consensus on the issue. An attempt had already been made last year to bring about coordination among the professional bodies working for the progress of the leather, Mr. Mitra pointed out.

This year, TGT will review the technological developments in the leather sector during the last year. The enzymatic removal of animal hair, upgradation of rural tanned leather, microprocessor-control-led tannery, and chrome recovery plant are the main areas to be touched.

On the new enzymes, Mr. Mitra said that the leather industry is planning to commercialise it. These enzymes will be used to remove animal hair, doing away with the conventional method. In his opinion, the low cost of production and high selectivity of the enzymes will make it economically and technically more viable. Sulphide pollution can also be checked with the new method.

Among the new leather making methods developed, the upgradation of lower ends and rural tanned leathers has been a major breakthrough. The former process helps cut down water use up to 40 per cent. This, in turn, will bring down the amount of effluents and provide a saving of 15 per cent in some chemicals.

Mr. Mitra said that upgradation of rural tanned leathers is necessary keeping in view the fact that villages are the main suppliers of many of the carcasses. A survey of CLRI says that carcass worth Rs. 600 crores is wasted annually.

Referring to other activities of CLRI, he said last year the institute helped in commissioning India's first microprocessor controlled tannery at Ranipet. It has now taken up development of indigenous microprocessor based control systems as part of its efforts in speeding up modernisation of small scale tanneries. A pilot facility for the purpose is being installed.

Besides, a chrome recovery plant was also set up in a commercial tannery in Kanpur as a part of CLRI's efforts in the Ganga Action Plan. The plant serves as a model for recovery and reuse of chromium from effluents. This will bring down the chromium content in the effluents.

Commenting on the draft for leather sector in the Eighth Plan, Mr. K.S. Jayaraman, Deputy Director, CLRI, said that the main accent will be on raw material availability and export. The projected export earnings for this year is Rs. 2000 crores to Rs. 2200 crores. At present, 60 per cent of the leather produced in the country is exported. A lion's share of

his is in the form of finished products. eather industry will insist on more ncentives from the Goverment for the xport of value-added products during he Eighth Plan, he said.

Referring to the low impact of CLRI n the footwear scene, Mr. Mitra cauoned that the situation can be changed nly by encouraging indigenous producon and designs.

BRIGHT FUTURE FOR LEATHER NDUSTRY

The importance of close interaction etween industries and research instituons was stressed recently by the Govrnor of Tamil Nadu, Dr. P.C. lexander.

In India the industries went in for onsultancy services offered by research stitutions and universities only when ey became sick. Industries should not inch from spending some money on onsultancy, the Governor said, inauurating the three-day 25th Tanners et-together at the Central Leather esearch Institute (CLRI) Madras on anuary 28. He advised the leather dustries to avail themselves of the serices offered by the CLRI at low rates a greater measure.

With exports expected to exceed s. 2,000 crores compared to Rs. 175 rores some 15 years ago, the leather dustry had a bright future and would lay an important role in increasing the are of manufacturers in the country's xports, Dr. Alexander said. The propects for capital goods industries were ot bright as they would have to face reign competition, require import of omponents and raw materials and ould have to offer soft credit and aid. he leather industry did not have to conend with these disadvantages in the eld of exports. Presiding over the funcon held at the new auditorium with a apacity for 400 built at a cost of Rs. 60 khs, Dr. A. P. Mitra, Director General f the Council for Scientic and Industrial Research, said the CSIR proposed to build such conference centres in Delhi, Calcutta, Hyderabad, Mysore, Goa and Lucknow.

In the recently framed action plan for science and technology for poverty alleviation, accent had been placed on boosting tanning industries and development of cost-effective locally available inputs. The CLRI's success in new processing techniques to reduce pollution effects needed to be publicised, he said. For village-level operation, research institutions like the CLRI should train the trainees.

Anti-cholesterol drug

On the activities of CSIR and other research institutions coming under it, Dr. Mitra said a new anti-cholesterol drug, 'Gugulipid', developed by the Central Drug Research Institute had been licensed to France and negotiations were underway for licensing a National Chemical Laboratory catalyst to a firm in Holland. Last year two reverse osmosis desalination plants were gifted to Thailand. Of the agrochemicals developed by CSIR, 15 were in production with an annual turnover of Rs. 100 crores.

In frontier areas, new materials for temperature superconductivity had been prepared and the first device was expected to be completed by March, said Dr. Mitra. The first all-science satellite, SROSS, expected to be launched from Shar by the end of this year contained a major payload from the NPL.

Mr. M.M. Hashim, Chairman, Council for Leather Exports and president, All India Skins and Hides Merchants Association, said sludge disposal was posing a problem in effluent treatment plants and urged the CLRI to come out with a solution. Mr. A. Sahasranamam, executive secretary, Council for Leather Exports, saw an increasing role for the CLRI in developing processes for finishing imported leather and in assisting the industry to meet export challenges.

Mr. Sanjoy Sen, chairman of the CLRI's research council, said the institute was going commercial and undertaking sponsored research. It was fully geared to taking technology forward. With UNIDO loans, its extension centres would be equipped to provide all the services needed by the leather industry.

Welcoming the gathering, Dr. A. B. Mitra, Director of CLRI, said that it would be launching a joint project on environment technology with the Dutch Government organisation, TNO, next month.

There was also a possibility of a UNIDO project in leather effluent treatment materialising for CLRI to work with the Tamil Nadu Pollution Control Board to erect a state-of-the art plant in a commercial tannery. Another UNIDO project on footwear design and development might also fructify next year.

Dr. K.S. Jayaraman, Deputy Director, said over 400 delegates were attending the get-to-gether sponsored jointly by the CLRI, Council for Leather Exports, All India Skin and Hide Tanners and Merchants Association, Indian Leather Technologists Association and Committee on Science and Technology in Developing Countries. Dr. T. Ramaswami, Senior Assistant Director, proposed a vote of thanks.

Call to spend more on R & D

Later delivering the Nayudamma Science Foundation lecture on "Science, Technology and national development", Dr. A. P. Mitra, called for increased investment by industry and Government on research development. He was of the view that money required for research and development estimated to be Rs. 10,000 crores by 1994-95, could be partly raised by levy on sales turnover of industries, cess, and surcharge on capital goods import.

HALDIA PROJECT

100 per cent EOU to meet feedstock needs

The Haldia Petrochemicals complex, for which Tatas have been selected co-promoters by the West Bengal government, will have a 100 per cent export-oriented unit to take care of foreign exchange requirement needs of feed-stock import.

Disclosing this, Mr. Darbari Seth, chairman of Tata Tea, the selected Tata company for the project, told a press conference at Bombay, that the Rs. 3,000-crore complex would be commissioned in about three years from the zero date. Foreign collaborators for various components of the project were short-listed and the project implementation would start soon.

The foreign exchange component of the project was placed at Rs. 650 crores and exercises had been initiated to find out ways of raising this requirement.

Mr. Seth said that Tatas were selected by the state government basically because of the three major conceptual ingredients in the proposal. Dubbing it as the "Tata concept", Mr. Seth said that it incorporated complete integration of the complex, a high degree of self-reliance and keeping away from related downstream or sidestream activities which could be undertaken by others.

He said that most petrochemical complexes around the world were wholly integrated and for the success of the Haldia Project the integration of the project should be such that the mother cracker and major down-stream projects were all strongly interdependent. Secondly, a high degree of self-reliance of the complex was necessary to ensure against adverse situtations over which the project would have no control. In this connection, he cited the supply position of the major feedstock, name naphtha, which should be fully ensure either from indigenous or overseas sou ces.

Further, Mr. Seth said, that the com plex would spawn related industries i the second and third generations of pr ducts and would not, unless compelle undertake any related downstream sidestream activities.

Mr. Seth said that Tatas had earli proposed to undertake the complex i the "assisted sector" in which the sta government would have a limited shar However, "in deference to wishes of th state government entirely without he itation, we agreed that the complex b undertaken by the joint sector compan in which the State Industrial Develop ment corporation holds 26 per cent an Tata Tea and its associates 25 per ce equity." The company, Haldia Petro chemicals Limited, which would under take the project — the single larges

ngle grassroot venture so far undertken in India, will have an equity capal of Rs. 750 crores."We developed nd presented to the state government n innovative scheme to raise the equity f Rs. 750 crores which however deviced from the joint sector model on which the government was keen to nplement the project," he added.

Mr. Seth said that the government's hoice for Tata's though a late entrant, was also largely on account of their abity to complete the project in time and aise adequate resources.

Mr. Seth said that the size of the proect was raised three-fold to conform to he current criteria for minimum ecoomic sizes (MES) to three lakh tonnes or the naphtha cracker. The project ost, because of the increase in the size nd other changes, had increased to Rs. 3,000 crores from Rs. 1,470 crores estimated in 1987.

The IDBI had already appraised the roject earlier and would again underake a similar exercise following some major changes in the proposal. The ecoomic cost of the project was placed at Rs. 2,100 crores and the financial cost Rs. 3,000 crores, the gap accounting for duties and other levies. The project would be viable in view of the growing demand for petrochemical products.

Mr. Seth said that nearly half of the requirement of the major feedstock, namely naphtha, would be met from indigenous sources, whereas the rest would be imported. The company had planned to have built-in facilities for exports of products like polypropylene which would earn sufficient foreign exchange to take care of the need for imports of the feedstock.

The complex, along with other downstream projects would provide employment to about 1.5 lakh persons. The Haldia complex (HPC) will produce annually three lakh tonnes of ethylene, 1.5 lakh tonnes of propylene, one lakh tonnes of HDPE, 1.6 lakh tonnes of LDPE, 53,000 tonnes of butadiene, 65,000 tonnes of benzene, and 80,000 tonnes of styrene and a host of other related products.

The integrated complex, Mr. Seth said, would not undertake any second or third generation industries which could be undertaken in the medium or smaller sectors. He said that WBIDC and Tata Tea had already formed a six-member committee to expeditiously implement various steps to lay the groundwork to ensure speedy progress of the project.

A six member committee, comprising three members each from Tatas and the West Bengal government, is to work out the modalities for expeditious implementation of the Haldia petrochemical project. The decision to constitute the committee was taken recently when Mr. Darbari Seth of Tatas met West Bengal Chief Minister Mr. Jyoti Basu for the final round of discussion on the project.

The most important step towards the implementation of the project will be to firm up financial arrangements. Industrial Development Bank of India (IDBI), according to its chairman Mr. S. S. Nadkarni, is going ahead with the appraisal of the project and it will initiate discussions with other financial institutions about their participation in the project as soon as the exercise is over. "We hope to complete the appraisal exercise soon," said Mr. Nadkarni. He reiterated that the choice of the partner was the West Bengal government's prerogative and IDBI was only concerned with the managerial and financial strength of the partner.

Asked about the cost of the project, the IDBI chairman replied, "we are sticking to the figure of Rs. 3,000 crores. "He did not think there would be any escalation, as the figure has already had some built-in cushion. Mr. Nadkarni hopes that Tatas would not change the product-mix, which had been finalised after protracted negotiations at different levels. Asked if the proposal for MEG (monoethylene glycol) as a downstream project had been dropped at the instance of IDBI, he said IDBI had pointed out the present overcapacity in MEG. "However, we did not force our opinion. Everything has been decided through discussions," he said.

NEW EXIM POLICY TO CONTINUE LIBERALISATION

Steel and Mines Minister Mr. Dinesh Goswami, said the new import-export policy, to be announced on April 1, will continue the process of liberalisation and give a thrust to export of high value-added products. Addressing the 31st annual general meeting of the Chemicals and Allied Products Export Promotion Council (CAPEXIL), Mr. Goswami said the policy will also aim at simplification of the procedures and plugging of loopholes so that the "unscrupulous elements" were not able to misuse the provisions of the policy.

Mr. Goswami said the government will continuously interact with the traders and try to find "positive ways" of solving their problems, "gradually and in a systematic way." Mr. Goswami said the balance of trade position at present was 'very tight'. The international scene was undergoing dramatic changes. He, therefore, asked exporters to take stock of the fast changing world scenario in the field. He urged traders to take full advantage of the liberal policy provisions, the various schemes formulated and achieve better export growth in the coming years. Describing CAPEXIL as a 'truly national organisation', Mr. Goswami asked exporters to give their suggestions through CAPEXIL for the formulation of the new Exim policy. Mr. K.K. Bhatia, chairman of CAPEXIL, said given the necessary support it was possible to substantially expand and accelerate the export growth of chemical and allied products.

U.S. oil output likely to fall

The US oil imports will probably rise to an average 10-15 million barrels per day by 2010, the U.S. Energy Department said recently.

In the annual outlook published by its energy information administration, the department also said US oil production will probab'y fall by four million bpd while demand increases by a similar amount.

The industry's American Petroleum Institute, based partly on Energy Deparment data, said that 1989 US production fell to an average 7.587 million bpd while 1989 imports averaged 7.952 billion, including finished products.

The Energy Department said US oil imports will grow by 60-130 per cent depending on prices, over the next 20 years despite growing production of natural gas that will help offset oil demand. The US will depend on imports for 54-67 per cent of its total petroleum supply in 2010, the department said.

Growing natural gas demand could push its production 20-30 per cent higher by 2000, the department said.

CALL TO STEP UP GAS, OIL RECOVERY FACTORS

India can become self-sufficient in oil by the end of the century if 'concerted exploration' and proper energy planning are made in this direction, according to a renowned scientist.

Prof. R. C. Fuloria of Oil India Ltd. said that of the total inplace oil and natural gas discovered so far in the country, only about 25 per cent of oil and nearly 55 per cent of natural gas was considered recoverable by normal production methods.

Utilising the tremendous advancement made in science and technology of reservoir engineering and petroleum product during the last few decades, the average recovery factors for oil and gas can be increased by 35 per cent and 65 per cent respectively in the immediate future, he said.

Therefore, the recoverable reserves of oil and natural gas in the country "can easily be increased by nearly 200 million tonnes and 100 billion cubic metres respectively without taking any major risks," he said.

Describing the future of petroleum exploration in India as very bright, Prof. Fuloria said that "comprehensive and integrated basis evaluation studies will have to be continuously carried out for all sedimentary territories to make exploration most efficient and cost-effective.

The country now produces about two-thirds of its annual oil requirement of about 50 million tonnes. "The conservative prognosticated resources of hydrocarbons are estimated at more than 20 billion tonnes which by increased exploration can "easily be raised to more than 50 billion tonnes," he added.

NEW NORMS FOR FOREIGN COs. SOON

The Petroleum and Chemicals Ministry is working on new norms for inducting foreign oil companies in offshore and onshore exploration.

They are looking into the earlier Government's plans on easing terms of entry and are expected to make up their minds in about two months' time when the fourth round of oil discussions start. With the exit of Col. S. P. Wahi, the Ministry is likely to look at the issue more objectively as the Oil and Natural Gas Commission Chairman was opposed even to the joint venture between Oil India and Hindustan Oil Exploration Corporation. Entrepreneurs, who had lost some of their enthusiasm, are hopeful of the Ministry favourably looking into plans of Indian compa to make a foray into oil exploration. companies quietly preparing plans Essar Gujarat, Great Eastern and Ta Essar Gujarat has opened prelimir talks with Occidental of US to se a joint venture to bid for offshore onward blocs. They have taken Dr. G. Ramaswamy, earlier Mem (Offshore), ONGC, as their adviser oil exploration.

Tatas are keeping silent but repo in Bombay House are that they are averse to the idea. British Petrole which has till now kept off India, m well team with a Tata compa Presently, Hitech Drilling of Mr. Ra Tata is in the contract drilling job w equity and technical collaboration Schlumberger, France. This company not likely to go for oil exploration.

Hindustan Oil Exploration Corpor tion (HOEC) is trying its best to bre the monopoly of ONGC and is curren hopeful of a positive response. Und the last agreement with foreign oil co panies, in the case of a post tax retur of 20 per cent the Centre retained 10 p cent, the contractor 90 per cent. Fro 20 to 25, the split is 20 and 80. It ris to 70 per cent for Government for pr fits of 30 per cent and above.

Shell, Chevron, Broken Hill Prope ties, Australia are working in vario blocs. The agreement provides for qui ting after doing seismic survey. B some of them are in the process of sei mic surveys and a fourth round coul make them rebid.

Being a highly capital intensive ve ture it is unlikely that there will be man Indian parties. Perhaps, only a coupl will really make a firm bid.

Also, Hindustan Oil Exploratio Corporation (HOEC), representin every big house excluding Relianc Industries Ltd., could be used by India private units for an uncompetitiv approach.

razil alcohol crisis puts drivers off their wagons

After a 14-year over-ambitious alco-l programme, Brazil has awakened th a crippling hangover which will quire more than fizzy potions to cure. e programme, which once attracted ernational interest and admiration, is aimed at making the bulk of the untry's cars run not on petrol but on cohol derived from sugarcane. The heme is now in tatters, leaving mil-ns of motorists with useless vehicles.

Some observers say the country could ind to a halt unless the government ds 1.5 billion litres of methanol hich, when mixed with petrol, can be ed as a substitute for alcohol. Domes- stocks of the alcohol are down to a w days' worth. The country's reserves oil are also declining, obliging the vernment to issue a petrol-rationing rning.

The main reason for the crisis lies th the sugarcane growers. With steady creases in world sugar prices, they ve gone back to producing sugar stead of alcohol. The crisis was aggra-ted last month with a freak accident Sao Paulo fuel depot. A bolt of light-ng sent 17 million litres of methanol in flames.

"Brazil has just awarded itself the ghest certificate of incompetence", mmented the respected Rio daily *lobo*. An estimated four million vehi-es (about half of the country's cars) e driven by alcohol-fuelled engines. one stage 95 per cent of all cars ma-ifactured by Brazil's motor industry n on alcohol.

But this year the pattern may be versed. Volkswagen do Brasil (the rgest VW complex outside West ermany) has already announced that line for 1990 will comprise 80 per nt petrol cars. Owners of alcohol cars e desperate. There are no buyers for e vehicles which they now want to get rid off. The only alternative is to spend up to £1,200 on converting their engines to petrol. Specialised garages and work-shops are making a fortune.

There were abundant signs last year that something was drastically wrong with the alcohol programme, among them 17 fuel price increases in 12 months. Gradually the gap between the price of a litre of petrol and a litre of alcohol narrowed, eroding the advan-tage of an alcohol-driven car. No sooner had the government sent out orders to find new methanol supplies than the ecologists woke up. Methanol, they claimed, is a dangerous ingredient.

Although burning "cleaner" than alcohol, its fumes have rather nasty side effects: these range from causing a feel-ing of general weakness to dizziness, headaches, nausea, temporary blindness, convulsions, coma and finally death.

The ecologists went to court and won a ban on the import of methanol in the state of Rio and on its use countrywide. The government won an appeal in the supreme court against the decision and a first shipment of 17 million litres from the United States has been unloaded in the port of Santos in Sao Paulo state.

But it is only a drop of what is needed to keep Brazil's cars running. The public tends to blame the alcohol pro-gramme's administrators over the years for what has been called "the greatest farce in Brazil's economic history". But their identities have disappeared in the labyrinthine corridors of the country's notorious bureaucracy. "May be they have all joined Alcoholics Anony-mous".

SM DYECHEM'S NOVEL ROUTE TO GET ALCOHOL

SM Dyechem Ltd. has devised a novel strategy to procure industrial alcohol for its new venture, SM Glycols. The company is undertaking to finance modernisation and technological upgra-dation of about a dozen distilleries in Maharashtra in return for a buy-back arrangement which will satisfy its feed-stock requirements.

Under a tripartite deal, leasing com-panies will provide the cash through SM Dyechem. SM will guarantee a mini-mum yield of 270 litres per tonne of molasses (as against the current aver-age yield of 220 litres) by converting the distilleries from batch process to con-tinuous fermentation. The project will involve a sum of approximately Rs. 20 crores. The money paid to individual distilleries will be adjusted against buy back of alcohol.

The entire feedstock requirement of 10.56 crore litres will be met by the scheme. Upgradation will also encom-pass improved storing arrangements. Today, many a distillery stores molasses in open pits, exposing it to the ravages of weather. This adversely affects the alcohol yield.

Some distilleries in the State have already incorporated Alfa Laval tech-nology, thereby improving the yield to 285 litres per tonne of molasses. Large scale adoption of continuous fermenta-tion process is expected to lead to a quantum leap in alcohol production in Maharashtra. The State had record sug-arcane production this year. The aver-age per acre cane yield has also gone up substantially.

The Maharashtra Government has given permission for setting up 17 more sugar factories in the State. Never in the past have so many new units been per-mitted. More than 100 sugar factories had operated this crushing season to nearly 115 per cent of their installed capacities. People in the sugar and dis-tillery industries do not agree with the Indian Chemical Manufacturers Asso-ciation which has forecast a shortfall of alcohol during the year.

ugar factories in India always aim et the maximum extraction of sugar adopt three to 3.5 boilings as comed to 2.5 boilings in Brazil. This not y brings down the sugar content in molasses, but due to repeated boils some of the sugar in molasses gets amalised, rendering the molasses erior compared to the molasses availe in other countries. Also, the sence of high calcium salts in Indian lasses is detrimental to yeast fermenion efficiency.

Financial institutions have concurred th the view that at prevailing alcohol ces, the alcohol route is more ecomical than the naphtha route for procing ethylene. The per tonne cost of ylene through the alcohol route will about Rs. 9,500 compared to . 12,500 from a naphtha cracker of nimum economic capacity.

SM Glycols project envisages the anufacture of 10,000 tonnes of ethyne oxide and 50,000 tonnes of monoylene glycol, besides smaller antities of DEG and TEG.

The project is coming up at Bhare vilge in Mulshi taluka of Pune district. e bulk of EO production will be conmed by SM Dyechem Ltd. and by SM chimmer & Schwarz Chemicals Ltd., group company.

LETTER TO THE EDITOR

Sir,

This has reference to the article entitled 'HIGH GROWTH FOR HYDROGEN PEROXIDE' by S.L. Venkiteswaran, in the CHEMARENA (of Chemical Weekly), January 2, 1990 issue.

In the last paragraph of this article, while discussing the Indian situation, the author states 'Technology is still the alkylanthraquinone oxidation route and there is no alternative to import'. This statement may appear to create the impression that the alkylanthraquinone oxidation route is an old technology and new technologies have since become commercially available. Hence, we would like to clarify that the alkylanthraquinone technology is even today the only commercial manufacturing technology for hydrogen peroxide and is being used throughout the world.

National Peroxide's associates, INTEROX, are the world leaders in the field of hydrogen peroxide and have perfected the alkylanthraquinone oxidation based technology. NPL has substantially expanded its manufacturing capacity and is fully poised to meet the entire domestic requirements of the country.

In U.S.A., Europe and Japan pulp and paper industry is presently showing surging demand for hydrogen peroxide due to two reasons, viz.:

a. Setting up of large capacity plants for manufacture of paper by "high yield" pulping process. Hydrogen peroxide and chlorine dioxide are the preferred bleaching agents for this high yield pulping process. In India, there is presently no such high yield pulping plant. Furthermore, since these plants are highly energy intensive, it does not appear very likely that we shall see such plants operating in India in the near future.

b. Furthermore, many European countries have implemented measures to restrict usage of chlorine, the common cheap bleaching material for paper industry. These measures have also boosted usage of H_2O_2 and chloride dioxide.

Unfortunately, in India chlorine and calcium hypochlorite continue to be widely used for bleaching of pulp. Consequently, growth of usage of hydrogen peroxide in paper industry is severely restricted. It is of course to be appreciated that hydrogen peroxide can never be expected to be as cheap as chlorine or calcium hypochlorite.

Signed
H.K. Mehta,
Executive Director,
National Peroxide Limited.

Environmental imperatives of process units suggested

A high-powered committee of experts from Indian industry, the government directorate of environmental protection, the EEC (Brussels), have together drawn up a list of recommendations on environmental imperatives in respect of process industry and submitted it to Mrs. Maneka Gandhi, Union Minister of State for Environment and Forests.

The following are the recommendations on the government's role:

For the existing industries, the environmental impact assessment (EIA) should be treated at par with the energy audit for the purposes of governmental support. The environment policy should be integrated with other national and regional policies and strategies for ensuring national programmes of high priority, such as increasing exports, improving balance of payment, better safety factor in industries, conservation of natural resources etc.

A combined single-window facility for simultaneous consideration of environmental clearance as well as manufacturing licences should be set up for avoiding project delays and cost escalation. Environment protection should be made an integral part of not only national but also regional development plans. In addition to the policy makers and administrators, experts from R & D institutions as well as industrial organisations should also have a say in drawing up the development plans.

The experts have made the following recommendations on the industry's role:

Industries should incorporate clearly defined environmental strategies and implement them through use of a scientific methodology and state-of-the-art technologies with a view to achieve zero-discharge level. They should also establish a separate division to take care of health, safety and environment and organise massive training programmes for employees. Health monitoring of workers should commence at the pre-recruitment stage and periodic regular check-ups should be held thereafter.

EC STEPS TO CURB POLLUTION

Unless the European Community takes action, the skies over a dozen countries will be polluted by nearly nine per cent more sulphuric oxide and up to 14 per cent more nitric oxide in the coming 20 years. This is the unsettling forecast made by a group of experts for the EC Commission. But the report, issued at the end of last year, was barely acknowledged and has been disc[...] even less.

The environment appears to b[...] "downside" of the 1992 single m[...] Whether the EC reacts in time t[...] danger will be seen in the upco[...] months. Ireland, now exercising [...] EC's rotating presidency, has be[...] the first country to make environm[...] concerns a major issue. By next [...] Dublin wants to make the strict U[...] exhaust norms apply to the EC [...] hopes to find a venue for a new [...] environmental agency.

In the first half of Apri[l], the Commission will be proposing st[...] engine emission norms for tr[...] Meanwhile, blueprints for way[...] restrict traffic in downtown city [...] are being prepared.

Some members of the EC Counc[...] Ministers appear to be preparing f[...] long drawn-out war of attrition on e[...]ronmental issues. Although the e[...]ronmental agency is supposed to tak[...] its task as quickly as possible, a [...] of-war is shaping up over where [...] agency should be located.

Berlin and Copenhagen are co[...]dered to be strong candidates for [...] agency, but aside from Luxembourg [...] the EC member countries have appl[...] The agency's task is merely to col[...]

and lay down comparable environmental norms and data, which has prompted criticism in the European Parliament's committee on the environment that the proposed agency is "without teeth".

Commission sources see a more realistic chance of success in introducing the strict US pollution norms for cars. A decision on this would dictate that starting in 1992, all newly-registered cars must be equipped with catalytic converters which meet the US standards.

But it is a well-guarded secret as to how stricter regulations on truck exhausts will look. The urgency of the matter is underscored by the experts study that one result of the single market will be a 30 to 50 per cent rise in cross-border truck traffic.

In April, the commission will be presenting a study about Europe's major cities and proposals on how to curb inner-city traffic. Among other considerations, a special fee could be imposed on downtown driving, or a driving ban could be set for certain areas at certain times of the day.

CME BEHIND DEATHS IN ION EXCHANGE

CME or chloromethyl ether is the main cause behind the recent spate of cancer deaths in the Ion Exchange plant in Ambernath, it is learnt from the Maharashtra Government's Factory Inspectorate.

The Inspectorate, however, feels that it would be difficult to take action against the management as the existing legislation is inadequate to punish erring management. The Factories Act, 1948 does not list CME among the banned chemicals, however, an amendment to the Act, passed in '87 does enjoin upon the management to take all precautions to protect the interest of the workers.

CALL FOR PROPER USE OF POWDER METALLURGY

The Minister of State for Science and Technology, Prof. M.G.K. Menon called for proper application of powder metallurgy in India.

As a technique this is of great use to India and the country can benefit from the experiences. The Soviet Union has advanced technology in this area, he said while inaugurating an Indo-Soviet seminar and exhibition on Powder Metallurgy.

This technology would have major applications, in titanium, from pollution control to space, he said. Dr. Vasant Gowariker, Secretary, Department of Science and Technology, said the research and production centre at Hyderabad could produce items for civilian use through powder metallurgy.

The Soviet Union has donated Rs. 34 crores worth of equipment for the project and the first instalment would arrive soon. India will give the necessary infrastructure and manpower.

CSIR AWARDS INSTITUTED

The Council of Scientific and Industrial Research (CSIR) has instituted two sets of technology awards to recognise and encourage technology development and multidisciplinary team effort of CSIR scientists and institutes.

One prize every year will be awarded in the area of biological, chemical engineering and materials technology to individuals or group, for achievement in technology development. Each prize consists of a citation and cash prize to the individual and the group.

Two running shields, one each for process and engineering technology will be given to a CSIR group laboratory on the basis of excellence of its specific technological achievements in a year in the area of biological, chemical, engineering and materials technology. The award will consist of a rolling shield to the selected group or laboratory.

Company Notes

THE TRAVANCORE-COCHIN CHEMICALS LTD.

Background

The Travancore-Cochin Chemicals Ltd., situated in the Alwaye-Udyogamandal industrial belt of Kerala was the first unit in the country to produce Rayon grade caustic soda. Incorporated in 1951, the company went into commercial production in 1954 with a capacity of 20 MT/day of caustic soda. In 1960, the Government of Kerala took over the company.

In four stages of expansion, the production capacity was increased, the present installed capacity for the various products being:

Product	Capacity (MT/Year)
Caustic soda	52,800
Caustic soda flakes & solid	19,800
Liquid chlorine	47,500
Hydrochloric acid (Commercial)	1,62,000

TCC is the mother chemical industry of Kerala, catering to the needs of many vital industries like pulp and paper, rayon, soap, rare earths, insecticides etc. Hindustan Newsprint Ltd., Kerala Minerals & Metals Ltd., Kerala Chemicals & Proteins Ltd., Tata Oil Mills, Grasim Industries, Travancore Rayons, Madura Coats, Kerala Soaps & Oils, Indian Rare Earths, Hindustan Insecticides Ltd., Fertilisers & Chemicals Travancore Ltd., Cochin Refineries Ltd., are some of the major consumers inside the State.

The company, which a few years ago was depending on a narrow customer base, changed the marketing strategy to reach a wider market on All-India basis. This strategy of delinking from a few local customers has helped the company to have steady production and capacity utilisation. Excellent product quality and reliability have given the company's products a good reputation in major markets in the country.

Performance

The history of TCC is an excellent example of the turnaround of a public sector company which was in deep red hardly a decade ago. In the year 1978-79, the company had an accumulated loss of Rs. 786 lakhs on a paid-up capital of Rs. 635 lakhs. By 1983-84 the company had wiped out its accumulated losses and began developing surplus. Since then the company has been making satisfactory profits, even with severe doses of occasional power cuts. It has started paying dividend from year 1988-89. The company enjoys good credibility with the financial institutions and banks. The performance highlights are given in Annexure I.

The company provides dire employment to nearly 1200 people a indirect employment to 2000 perso Industrial relations climate is excelle The monthly incentive and ann bonus are linked to production. In lon term settlements, the company bargai on productivity improvement issues

Safety and pollution control are gi top priority. Regular safety traini classes are arranged for employees a customers on handling of chlorine. T company has received many awards f performance in safety from the Natior Safety Council. The company w awarded the first prize for pollution co trol among heavy inorganic chemic industries for the year 1988-89, by t Kerala State Pollution Control Boar

Future plans

The company has almost complet by using internal funds generation, i Rs. 665 lakhs project for replaceme of graphite anodes in its electrolyt cells with energy efficient titaniu metal anodes. With the implementatio of the entire project, there will be pow saving to the tune of 30 million uni per annum. As the first step towar replacing mercury cells with membra cells, the company is modernising i brine system at a cost of Rs. 300 lakh Also certain new diversification projec are on the anvil.

Annexure I
Ten Year Financial Statistics

	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
Source of funds										
Share capital	635	635	660	660	660	660	660	660	660	660
Reserves and surplus	-	-	-	-	45	126	288	166	328	478
Loan funds	1752	1656	1470	1146	1039	761	703	700	459	286
Total	2387	2291	2130	1806	1744	1547	1651	1526	1447	1424
Application of funds										
Net fixed assets (incl. capital work-in progress)	1202	1118	1060	967	884	766	709	642	704	847
Investments	11	1	1	1	1	1	1	1	1	-
Net current assets	403	521	688	684	859	780	941	883	742	577
Accumulated loss	781	651	381	154	-	-	-	-	-	-
Total	2387	2291	2130	1806	1744	1547	1651	1526	1447	1424
Profitability										
Sales incl. misc. income	1056	1323	1600	1521	1392	1954	2357	1782	2252	2711
Profit/loss before depreciation	147	273	425	383	373	256	342	(19)	252	364
Depreciation	142	143	154	157	174	154	116	103	70	108
Net profit/loss	5	130	271	226	199	102	226	(122)	182	256

Symposium on Frontiers of Electrochemistry (Science & Technology)

The Society for Advancement of Electrochemical Science and Technology (SAEST) which was founded on 14th November 1964 completed its twentyfifth year of fruitful existence on 14th November 1989. To coincide with this happy occasion, SAEST in collaboration with the Central Electrochemical Research Institute Karaikudi organised an International Symposium during 14-16 November 1989 at Taj Coromandel Hotel, Madras.

Theme of the Symposium

This International symposium was fourth in the series of international symposia organised by SAEST. The symposium theme was 'Frontiers of Electrochemistry' and it threw open the entire spectrum of electrochemical science and technology. The following frontier areas had been identified:

Membrane cell technology
High energy density batteries/fuel cells
Concrete corrosion
Amorphous and composite materials
Pollution control
Electrocatalysis/Underpotential deposition
Photoelectrochemistry
Cyclic voltametry & electroanalytical techniques
Electrobiology
Conducting polymers/electropolymerisation
Plating for electronics
Mass transfer in electrochemical reactors
Water electrolysis/hydrogen production
Electrorefining for superpurity metals

Research papers were presented in almost all the topics of interest. The delegates were exposed to the most recent developments in both the basic and applied aspects.

Inauguration

On 14th November 1989, the symposium was inaugurated by Prof. Roger Parsons, FRS of University of Southampton, UK. Presidential address was given by Dr. K. Balakrishnan, Vice-President, SAEST. Prof. S.K. Rangarajan, Director, Central Electrochemical Research Institute, Karaikudi delivered the welcome address. A souvenir brought out on this occasion was released by Shri S.K. Jain, Chairman, DCW Ltd., Dr. N.S. Rengaswamy, Secretary, SAEST proposed a vote of thanks.

Invited lectures

Eminent scientists of international repute gave lectures on selected topics: Prof. Roger Parsons and Prof. F.C. Walsh from U.K., Dr. B.V. Tilak from USA, Prof. P. Sartori, Prof. K.F. Zeighan, Prof. W.I. Plieth, Prof. K.G. Weil, Prof. J.O. Besenhard and Prof. K. Juttner from West Germany, Prof. E. Pungor from Hungary, Prof. Y. Matsumara from Japan, Prof. E. Budevski from Bulgaria, Dr. Ashok K. Vijh from Canada, Prof. Yu. I. Kuznetsov from USSR, Prof. S.K. Rangarajan, Prof. S. Sathyanarayana, Dr. S.R. Rajagopalan, Prof. U.K. Chatterjee, Prof. S.H. Pawar and Prof. M. Lakshmanan from India. On the whole there were 22 invited lectures. Wide range of topics such as selective ionic adsorption impedance spectroscopy, electrocatalysis, ion selective electrodes, photoelectrochemistry, photogeneration of hydrogen from sea water, electrochemical fluorination, electroless metal deposition, optical composites, stress corrosion cracking, electrochemical reactors were covered.

Poster presentation

Highlight of the symposium was poster session. To facilitate greater personal interaction and communication all the contributory papers were presented as posters. There were six poster sessions of 60 minutes each. About 230 papers were presented. Contributory papers presented in the poster sessions covered the following areas:

Corrosion science and engineering
Electrodics, electrobiology and pol[lu]tion control
Electrochemicals
Electrochemical material science a[nd] instrumentation
Electrometallurgy
Metal finishing

Panel discussion

An important topic "Electrochem[is]try — Challenges and opportunities" had been chosen for panel discussi[on] and the topic attracted enthusiast[ic] response from the delegates.

Prof. Roger Parsons of Southampt[on] University initiated the discussions. Th[is] was followed by brief presentatio[ns] from scientists of Central Electrochem[ic]ical Research Institute, Karaikudi. Eminent electrochemists made this sessio[n] livelier by their thought-provoking idea[s] and view points. In fact, it was a brai[n]storming session covering the entir[e] scenario on status of research in elec[tro]chemical science and technolog[y]. Prof. S.K. Rangarajan, Director CECRI, summed up the proceedings.

Exhibition

There was an exhibition of electrochemical products and equipments a[t] the symposium venue. The followin[g] firms exhibited their products at the symposium: M/s. PH Products Co. Hyderabad; M/s. Komal Agencies Bombay; M/s. Micro Devices an[d] Computers, Bombay; M/s. KLB Instruments, New Delhi; M/s. Titaniu[m] Tantalum Products (P) Ltd., Madras; M/s. Toshniwal Bros. Ltd., Madras; M/s. TEAM, Madras.

The symposium had been cosponsored by the following organisations: CSIR, New Delhi, Department of Science and Technology, New Delhi, Dharangadhra Chemical Works Ltd., Sahupuram, Grasim Industries Ltd., Bombay, High Energy Batteries (India) Ltd., Mathura, The Mettur Chemical & Industrial Corpn. Ltd., Mettur Dam, TEAM, Madras.

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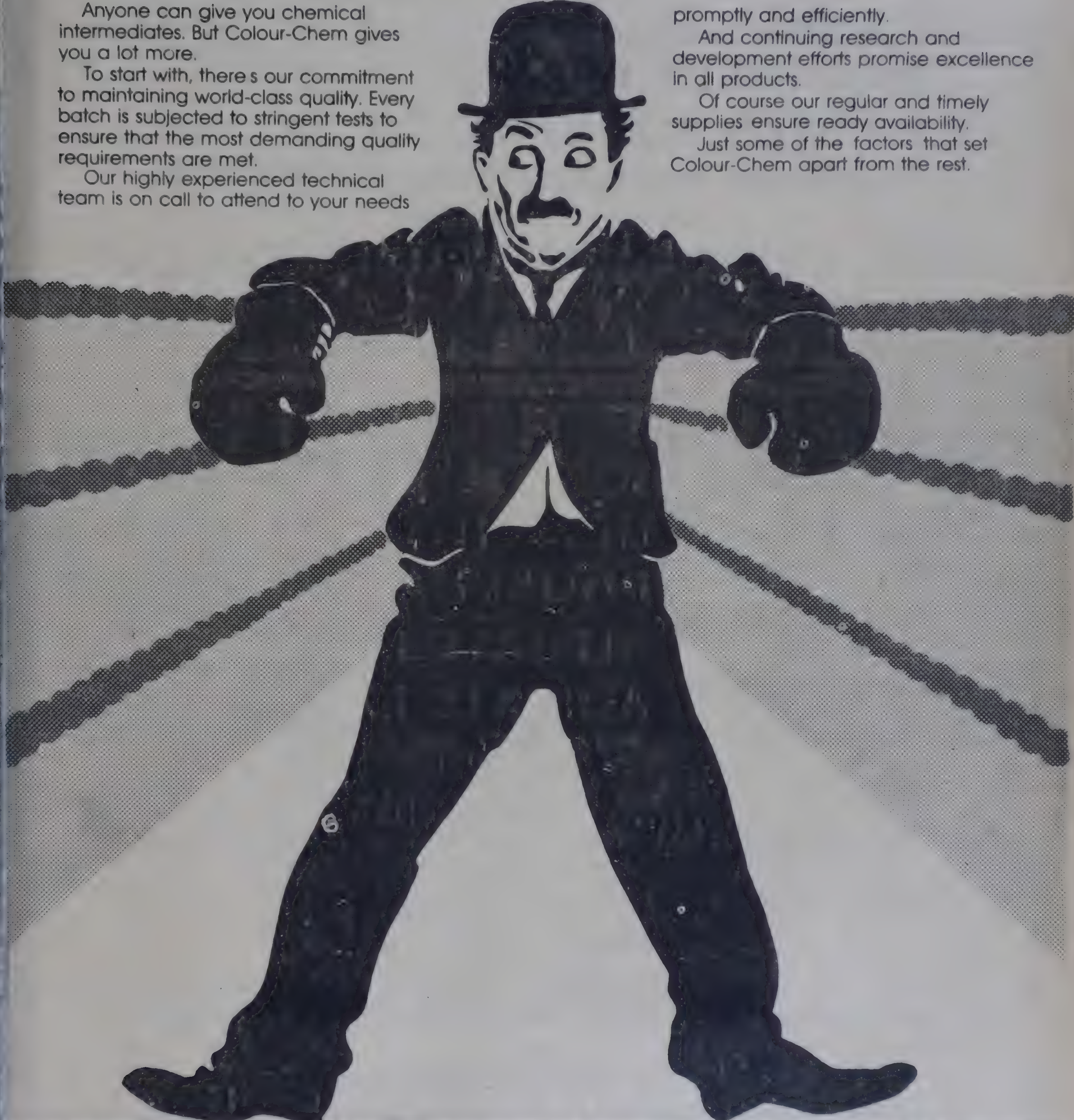

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Highlights in Chemical Technology (Part 1)

MICROWAVE REACTOR DEVELOPED TO SPEED UP SYNTHESIS OF CHEMICAL COMPOUNDS

Chemical compounds can be produced in a fraction of the normal times by means of a new microwave reactor developed by Australia's Commonwealth Scientific & Industrial Organisation (CSIRO), Melbourne. For example, preparation of isopropyl acetate conventionally requires refluxing isopropanol and acetic acid with sulphuric acid as the catalyst for 24 hours to achieve a 46% yield. Using the new continuous microwave reactor, the developers pumped the reactants through a reaction coil 3m long by 3mm diameter at 10.5 ml/min., 970 kPa and 158°C and got 98% yield.

In the reactor called Microlab, feed is pumped at up to 25 ml/min through a coiled tube of polytetrafluoroethylene (PTFE), which is transparent to microwave. Temperature is limited (by the PTFE) to 200°C. Microlab is being produced by Industrial Microwave Applications (Sydney, Australia) under a license from CSIRO, which has also commissioned the company to build a 2.5 l pilot unit by early 1990. Potential applications include production of pharmaceuticals, polymers, foods, fine chemicals and dyes. (*Chem. Eng.*, 11/1989, p. 17).

SUMITOMO (JAPAN) UNVEILS A SUPERIOR PETROLEUM-DESULPHURISATION CATALYSTS

A petroleum-desulphurisation catalyst that is said to be 50% more active than conventional types has been recently unveiled by Sumitomo Metal Mining Co. (Tokyo, Japan). The cobalt-molybdenum catalyst was developed in response to a new government regulation, scheduled to take effect in 1991 that will require the sulphur content of diesel fuel to be less than 0.2% compared with 0.3% at present.

Unlike conventional catalysts, the new one does not require sulphiding prior to use, the company reports. Currently it is used in a fixed bed reactor. Sumitomo plans to commercialise the product in the spring of 1990. It will be sold through Nippon Ketgen Co., a joint venture between Sumitomo and Akzo Chemie Nederland B.V. of the Netherlands. (*Chem. Eng.*, 11/1989, p. 17).

ZEOLITE SHOWN TO OUT-PERFORM ACTIVATED CARBON IN SOLVENT REMOVAL IN SWEDEN

A Swedish painting facility is using a proprietary hydrophobic-zeolite adsorber that removes 99% of the hydrocarbon solvents from a water-air stream without adsorbing water. Conventional activated carbon systems have lower recovery rates and adsorb moisture, so they require larger adsorbent beds and use more energy, reports Eva Sundell, an application engineer with AGA Gas AB (Stockholm). AGA which runs the painting operation, co-developed the system with Munters Zeol AB (Stockholm, Sweden), a zeolite maker.

When saturated the $400,000, 1000 m^3/hour system is regenerated by blowing 180°C nitrogen through it. The inert gas allows saturations of around 200 g/m^3 to be handled safely during regeneration, Sundel reports, compared with 10-20 g/m^3 when air is used as a purge. (*Chem. Eng.*, 11/1989, p.p. 17-19).

MUNICIPAL GARBAGE CONVERTED TO A CARBON FUEL ANALOGOUS TO LIGNITE

Municipal garbage is transformed into a fine grained carbon fuel, analogous to lignite in a partial-combustion process developed by Frontier Industries Inc. (Burlington, Iowa). The company has already built a 10 ton/hour feed), commercial scale plant that produces 300-350 lbs of fuel from each ton of organic waste. The product may be sold as powder or briquettes for industrial fuel.

Non-organic material is separated from the waste, which is then shredded into particles of 1 1/2 inches or less and fed into the top of a vertical combustion column. The material moves down to the bottom of the column, where it is burned by process off-gas, but the air intake is controlled to permit only partial combustion. Volatiles are drawn off about half-way down, separated from particles in a cyclone, then stripped to a residual organic in an afterburner.

The plant costs $5-$6 million and the processing cost is $20/ton of solid waste, but the company says the saleable fuel product and self-fueled feature give it an economic advantage over landfilling. (*Chem. Eng.*, 11/1989, p. 19).

PROGRESSIVE GROWTH OF CFC ALTERNATIVES IN AFFLUENT COUNTRIES

The affluent countries of North America and Europe are the biggest producers of CFC which destroy the stratospheric ozone in the Antarctic. Therefore, it is appropriate that CFC alternatives should also come from these countries. In these affluent countries there is a pressing awareness for restricting CFC production. Therefore, hardly a month goes by without news of ongoing efforts to develop substitutes for chlorofluorocarbons (CFCs). Last October was noteworthy for a number of major announcements. For instance, Du Pont Co. has a developmental pro-

duct for metal cleaning that performs better than CFC-113. The product is an azeotrope-like blend of the hydrofluoro carbons (HCFC) 123 and 1416. It removes grease and water soluble oil residues from common metals and is more compatible with aluminium parts. This alternative cleaning agent has an exceptionally low surface tension and viscosity, allowing it to penetrate into tight clearances. It also does not become flammable during boiling or evaporation. The product has 94% less ozone depleting potential.

Retrofitting will be required to use the blend in conventional vapour degreasers. Condensers will have to be operated at lower temperatures because of the new blend's low boiling point. Solvent resistant seals and gaskets made of fluoropolymer or organic polysulphide resins are recommended because of the stronger solvency. The cleaning agent is available in limited quantities for customer evaluation, reports Du Pont. To date the company has introduced 'Freon' SMT and MCA, two interim cleaning agents with 25% and 37% less ozone-depleting potential than CFC-113 and announced two long term cleaning agent candidates for CFC-113.

In Japan, Toshiba Corp (Tokyo) has developed equipment for cleaning substrates for liquid crystal displays. The novelty of the system is that it is the first to use water instead of CFCs to clean thin film substrates during the processing of the materials. Overall, the amount of CFCs used in the production of the liquid-crystal substrates is halved, reports Toshiba.

The equipment features a nozzle that shoots water and foam at high velocities without harming the substrates. The water removes about 99% of any particles larger than 0.3 micrometers (at a processing speed of one large substrate per min). The system is undergoing trial operations, and will be introduced to the colour liquid-crystal-display production line in Toshiba's Himeji plant by the end of 1989.

Meanwhile, a new organisation, the Industry Cooperative for Ozone Layer Protection has been formed to work with the EPA of USA in a worldwide attempt to reduce and eliminate the use of CFCs as solvents. The initiative comes from AT & T, Boeing Co., Honeywell Co., Motorole Co., Northern Telecom Co., and Texas Instruments Inc. Besides encouraging the prompt adoption of safe environmentally acceptable CFC alternatives, the organisation will act as a clearing house for information on the topic. (*Chem. Eng.*, 11/1989, p.p. 60-63).

A NEW LOW TEMPERATURE PROCESS FOR THIN-FILM DIAMOND COATING GIVES SMOOTHER COATING

Thin films that are smooth, transparent and of 'extremely fine grain' — less than 100 angstroms — have been deposited on various substrates by a new process under development at the Univ. of California (Los Angeles). In contrast, conventional chemical vapour deposition (CVD) methods produce rougher, highly faceted films, reports Rohinton Bunshah, head of the research team and a professor of Materials Science & Engineering.

In the new process surface temperatures go no higher than 350°C whereas CVD requires a substrate temperature of 900-1000°C, limiting the useable substrate materials. Diamond films have many potential applications as protective coatings and in electronics, because of their hardness, thermal conductivity and electrical resistivity.

The UCLA process is done in a vacuum chamber. An electron beam vaporises atoms from a graphite block in a hydrogen plasma environment, then the carbon deposits as a diamond film on a substrate. The research work was sponsored by Diasyn Technologies Ltd. Toronto, Canada. (*Chem. Eng.*, 11/1989, p. 21).

GLASTEEL 9100 — A PROPRI TARY GLASS LINING SYSTEM WITH ENHANCED CORROSIO AND IMPACT RESISTANCE

Glasteel-9100 is a silicate-based gl with oxide modifiers lining designed Pfandler — US Inc., to enhance cor sion and impact resistance in carb steel tanks, piping and columns used chemical processing and pharmaceu cal applications. The material can wi stand thermal shock (a rap temperature change) to 230°C a impart to 33 Newton meters, and h corrosion resistance to acid measuri to 1.3 mils/yr.

This glass-lining system was exh bited at the 1989 Chem Show la December in New York, USA. F further information contact Pfandle US Inc. Rochester, New York, USA

A NEW PROCESS CONVERTS NATURAL GAS TO DIESEL FUE

Production of diesel fuel could be potential use for Norway's vast supp of North Sea natural gas. In a three ste process, using a 'slurry reactor', tech nologists have converted the gas, whic consists essentially of methane, to middle distillates oil fraction fro which diesel fuel is recovered. Jet av ation fuel also can be obtained.

The three-year study, costing som $10 million, involved collaboratio among scientists of Statoil, the Norwe gian State Oil Company; Sint Research Centre, an offshoot of th Technical University in Trondhein Orlu's Institute of Industrial Resear and California based GTO Inc.

The method now will be tested in pilot plant. A commercial unit is hardl likely before the mid-1990s. Norway' current proven recoverable reserves o natural gas total 105 billion Cu F enough to last for more than 100 year

resent demand rates. Although gas xported, and some is used as feed-cks, for making ammonia and urea, country is seeking ways of upgrad- it to higher value added products. & *EN*, 6/12/89, p. 21).

'C CATALYSTS — A NEW NGE OF PROPRIETARY CKEL CATALYSTS FOR FIXED D REACTOR PROCESSES

A new generation of highly stable drogenation catalysts with improved ivity and selectivity, and a nickel ntent well below that of alternative ducts, has been recently unveiled by earchers at Crossfield Chemicals K), part of the Unilever group of npanies. Tradenamed HTC, the cat-sts applications include reduction of aromatic components of solvents d white oils and hydrogenation of rolysis gasoline, resins and waxes.

The catalysts consist of small nickel stallites with a specific nickel surface a greater than 150 sq. meters per m of nickel, deposited on a porous pport medium. Pore size of the sup-rt can be varied depending on the ended use, resulting in reduced dif-sion limitation within the catalyst. signated for use in fixed-bed reactor cesses, the HTC catalysts were veloped jointly by researchers at ossfield and Unilever's research ntre in the Netherlands. (*C & EN*, 17/89, p. 24).

LASTIC RECYCLING SYSTEM PARATES *PET* AND *HDPE* ROM OTHER PLASTICS

A plastic recycling system that sep-ates polyethylene terephthalate (PET) d high-density polyethylene (HDPE) m other plastics has been developed the Centre for Plastics Recycling at tgers University under the National ience Foundation Industry — Univer-y Cooperative Research Programme. rrently at a pilot plant stage, the types plastics are separated manually. Peter Jones, manager of the pilot plant reports that 750 lb of plastic waste can be separated that ways.

In the future, separation can be automated mainly by photo cells and infrared reflectance detectors. The first commercial plastic bottle recycling plant to use the Centre's process will be built in Logan Township, NJ. In addition, the Centre has a demonstration system that extrudes forms made from the plastics that remain after the PET and HDPE have been removed. This process employs technology developed by Advanced Recycling Technology (Belgium). The extruded plastics can be used in such products as park benches, etc. (*ES & T*, 10/1989, p. 1177).

TWO INNOVATIVE PROCESSES UNDER TEST FOR REMOVING ORGANIC COMPOUNDS FROM POTABLE WATER

Two innovative process to remove organic compounds from drinking water are being tested at Michigan Technological University. The object is to remove trihalomethanes (THMs) and other toxic disinfectant by-products (DBPs) that result from chlorination of water.

The processes are photo-catalytic oxidation and phase transfer catalysis. Photocatalysis uses a metal oxide additive that produces powerful oxidants in the presence of sunlight or ultraviolet light.

Phase transfer catalysis uses an adsorbent to concentrate the organics; a strong oxidant such as hydrogen peroxide is then applied to the adsorbent, which itself acts as a catalyst to enhance oxidation efficiency.

The project is being conducted by the American Water Works Association and Brown & Caldwell Consulting Engineers (Pleasant Hill, California). (*ES & T*, 9/1989, p. 1030).

Food & Pharmaceutical Technology in Perspective

TURAL COLOUR FOR USE IN ODS

A recent article on Cereal Foods rld lists different natural colours roved for use on foods in the USA. approved natural colours are: atto extract, beet powder, caramel, -carotene, cochineal extract, grape extract, fruit juices, vegetable es, paprika, turmeric and turmeric resins. The properties of natural ours and their limitations are dis- sed in detail. (*Cereal Foods World*, (7), 1988, 553-554, 556, 558-565).

ATED ASCORBIC ACID FOR IN FISH FEED

anochemo Inc. (USA) has deve- d a coated form of ascorbic acid ler its trade name Davitin C-80) for in fish feed. This coated form is gned to remain stable during stor- It demonstrates resistance to high peratures and humidity during pel- g while maintaining the same bio- lability as ascorbic acid. (*JAOCS*, 89, p. 1282).

SERVATION OF FROZEN H BY ASCORBIC ACID

he shelf-life of frozen fish may be nded for several months by a treat- t with ascorbic acid, which can be ied by either dipping or spraying at vel of 0.5-3%. To ensure an even sufficiently thick coating, a thick- g agent should be added to the solu-

or shrimp and prawns, a combina- of citric and ascorbic acid vs the best results (0.5% ascorbic + 0.5% citric acid). Here also a ening agent will improve the pre- ative action. (*Food Eng. Intl.*, 89, p. 42).

RESEARCH ON LEUKOTRIENE ANTAGONISTS PROMISE NEW ANTI-ASTHMA DRUGS BY 1990-91

As the role of the peptidoleukotrienes (LTC^4, LTD^4 and LTE^4) as initiator in asthma and other allergic conditions has gained increasing acceptance. Pharmaceutical companies have stepped up the pursuit of selective leukotriene antagonists. Despite an increase in the occurance and severity of asthma in industrial countries, specialists in the field point to a dearth of new, innovative drugs. Although the chemical structure of the leukotrienes were elucidated a decade ago, there is still no drug in the public domain. But this situation can be expected to change in 1990-91.

At a Society for Drug Research Symposium on leukotrienes recently, an ICI Pharmaceuticals researcher announced the results of an initial clinical trial of an LTD^4 antagonist (ICI 204, 219) for the treatment of asthma. Victor Matassa and his groups' study suggests that the compound is orally active, has a high affinity for LTD^4 and is an effective and safe antagonist against the peptidoleukotrienes.

Matassa claims that no distrubing side effects were observed. Other LT antagonists have exhibited hepatotoxicity in mice or camel digestive upsets. The compound may also address the need for a drug with a relatively sustained duration of action.

Hydroxyacetophenones, indole acyton fonamites and LTD^4 analogues are all under review as possible anti-asthma drugs. Smith Kline & French, Merck, Eli Lilly are among other companies pursuing leukotriene antagonist research. (*Chem. & Ind.*, 10/16/89, p. 660).

A NATIONAL REMEDY BASED ON LACTIC ACID BACTERIA FOR STOMACH UPSET

Stomach upsets can be prevented by a new naturopathic drug called Docidus. The tablet contains a high proportion of Lactobacillus acidophilus, lactic acid bacteria normally present in the bowels. Ten years of tests under medical control have not shown any side-effects, claims the manufacturer Arla of Sweden's dairy group of companies, the sudden influx of bacteria neither upsets the natural bacteria balance inside the bowels, nor causes immunity to antibiotics. (*Sweden Industrial News*, Oct. 1989).

WORLD'S TOP 13 INNOVATIONS IN FOOD SCIENCE SINCE 1939

The August issue of Food Engineering International lists world's top 13 innovations in food science since 1939. Our country India is so well behind in food science that very few of these 13 innovations have come to India. These 13 innovations have helped ensure healthier eating and have reduced food bills significantly in the affluent countries of North America and Europe. The death rate from heart disease has declined 20% and the death rate from strokes has fallen more than 30% during the last two decades, due in past to more nutritious food choices.

The top 13 innovations are:

1. Aseptic technology has been a remarkable development as Tetra Pak will readily affirm. Every day, it is estimated that roughly 100 million aseptic packages roll off Tetra Pak machines around the globe.
2. Minimum safe canning procedures.
3. Microwave oven has made a revolution in home cooking.
4. Frozen concentrated citrus juices.

5. Atmosphere controlled packaging for fresh fruits and vegetables.
6. Freeze drying.
7. Frozen meals.
8. Food fortification practices.
9. Ultra high temperature/short term sterilisation of milk and other products.
10. Microprocessor-driven lab instruments. The everyday microcomputer has added remarkable abilities to lab instruments, thanks to expanded memory capacity. Rapid assays for microorganisms is one of dozens of examples.
11. Irradiation of foods in all its forms.
12. Aspartame, is the world's leading man-made low calorie sweetening agent. It is the world's top most high intensity sweetener, which has been approved in 79 countries.
13. Supercritical extraction, especially in the flavour industry.

LOW CALORIE FAT REPLACERS POISED FOR GROWTH IN THE 1990s

Fat replacers represent by far the largest growth area aiming the food ingredients and by 1996 their sales should pass those of intensive sweeteners, such as aspartame and saccharin particularly in affluent countries, predicts Robert Aries, a consulting engineer with the research and engineering firm, Reach Associates Incorporated (South Orange, N.J.). Current annual sales of aspartame are about $900 million).

Within a generation, 8 per cent of world edible fat consumption (currently 60 million tons/year) will be of the low calorie type, according to Aries. In these products, fat calories can be reduced 50-90 per cent by molecular manipulation of vegetable fats, natural starch dextrins and edible proteins. About eight are available now, he reports, and another dozen should be on the market in the early 1990s. (*Chem. Eng.*, 11/1989, p. 25).

NATIONAL RESEARCH COUNCIL OF USA ISSUES NEW GUIDELINES FOR ESSENTIAL VITAMINS AND MINERALS

National Research Council (USA) last October set new guidelines for essential vitamins and minerals with reference to the American diet that contain significant changes in the recommended amounts needed to stay healthy. The new guidelines replace those issued in 1980.

The updated guidelines reduce the recommended daily intake of a number of vitamins and minerals, including sodium, iron, folic acid and vitamin B12. NRC increased the recommended calcium intake for persons under 25 and for the first time established recommended intake levels for the important blood clotting vitamin K and the trace element zelenium.

For most adults, the recommended daily allowance (RDA) for Vit C remains unchanged at 60 mg/day, about the amount in one orange. But smokers, who eliminate vitamins rapidly, should consume 100 mg daily. According to NRC, taking large doses of vit. C, does no good because body can store about 1500 mg of vit C and excess vit C is excreted in the urine.

The RDA's are used in USA to gauge the adequacy of the nation's food supply and the nutritional status of its population. They are reflected on food labels and are used to guide Federal Food Assistance Programmes. (*CMR*, 10/30/89, p. 5).

RESEARCH IN USA ON ANIMAL TESTING ALTERNATIVES VIA BONE MARROW CULTURES & SKIN TESTS

Briston Myers Squibb (New York) and Marro Tech (Elmsform, N.Y.) are developing non-animal product safety tests, based on Marrow Tech bone marrow cultures. Bristol Myers S[...] will use the tests to screen for mu[...] and other toxic effects of its ph[...]ceuticals. Marrow Tech is also wo[...] with Battelle (Columbus, Ohio[...] alternatives, using the Elmsford [...] skin equivalent. (*Chem. Wk.*, 11/[...] p. 17).

TRYPTOPHAN PRODUCTIO[...] INDUCED IN BACTERIA

Australian researchers at the U[...]sity of Melbourne have developed [...] scale process for low cost product[...] tryptophan (an essential amino [...] Commercial production of trypt[...] so far has been difficult and expe[...] restricting its extensive use in ph[...]ceutical and health foods.

Although animals are generall[...] able to manufacture this amino [...] bacteria can synthesise it via ferm[...]tion from sugar. But bacteria pr[...] only enough tryptophan for their e[...]tial needs — they have develo[...] number of control mechanisms tha[...]ulate production of this amino a[...]

The Australian research tean[...] been able to identify this control m[...]anism and have developed the tech[...] to 'switch' them off, to increase the[...]duction of tryptophan. The resear[...] add the copies of certain genes t[...] bacteria's DNA to enable the org[...] to make 100-times more trypto[...] This breakthrough gives hope for a[...] tech route in future for commercia[...]duction of tryptophan. (*Asia - P[...] Tech Monitor*, Nov./Dec. 1988, p[...]

GRAPESEED OIL — A NEW COOKING OIL WITH LOW[...] SATURATED FAT LEVELS

Grapeseed oil is a by-product [...] wine industry. The oil has been us[...] generation in the Mediterranean [...]tries and is now getting popular in [...] as a cooking oil. The oil is ext[...] from wine grape seeds. After the g[...] are pressed to harvest the juic[...]

eds, leaves and stems remain. Grapeed oil manufacturers separate the eds, then dry them, heat them and ess the oil. It takes 1000 pounds of ne grapes to manufacture 4 lbs of apeseed oil.

It is reported that grapeseed oil has e of [illegible] saturated fat levels in e cooking oil market and contains ore linoleic acid than any other cook- oil. Tests on the oil has shown that contains 77% or more linoleic acid.

The wine industry in India is coming fast in Goa, Karnataka and Mahahtra. However, our grape industry is aware of the significance of grape-d oil. The grape seeds are going to ste at present. Indian entrepreneurs uld look at this waste for the protion of grapeseed oil for consumpn by the effluent health-conscious tion in urban India. (*JAOCS*, 8/1989, 1043).

US PATENT CLAIMS A SUPER-R FORM OF VIT. C

A new US Pat 4,822,816 covering er-C polysorbate, describes a new m of vit. C (ascorbic acid). The ent claims, this new form of vit. C ers the bloodstream in half the time, ubles the amount of vit. C entering blood and doubles the time the rient circulates through the body en compared to ordinary vit. C.

n addition, while regular vit. C ses through the body with 78%-88% its nutrient potential being wasted, ereas the new form wastes only one-d as much and sends four times more the nutrient to the tissue level. The ve patent has been issued to Oxycol oratories (subsidiary of Inter Cal) of scott, Arizona.

P XXII, NF XVII BECOME FICIAL ON JAN. 1ST 1990

The US Pharmacopoeia (USP) and National Formulary (N.F.) are the most renowned and sought after reference texts for pharmaceutical industry the world over. They are world leaders in establishing high standards for pharmaceuticals and cosmetics ingredients worldwide. They are among the few national pharmacopoeias and formularies which bring out their revision on time.

The 22nd revision of the USP and the 17th edition of the NF, combined for the third time into one volume has now come out of press in USA (since September 1989), indicating precise programming of the publication. The USP includes nearly 3,000 monographs on drug substances and dosage forms. The NF XVII includes approximately 250 monographs in inactive agents or excipients known as pharmaceutical ingredients.

The USP Committee of Revision operated under a policy favouring the reduction, refinement on replacement of drug quality tests that require the use of animals, Result: new chapters redefine the USP pattern of in-vitro and in-vivo methods.

Other chapters: new antibiotic standards; drug release/dissolution criteria; expanded excipient coverage; two new chapters containing hundreds of revisions of older monographs on impurities and adoption of Bacquerel unit to replace a Curie unit as a matter of international agreement.

There are in addition, new chapters on scanning electron microscope (SEM) and water solid interactions in pharmaceutical system. In addition, some 56 new monographs appear for the first time in the new volume. The volume (USP + N.F.) covers 2,067 pages. It can be ordered from USP Orde Processing Dept. 701, 12601 Twinbrook Parkway, Rockville MD 20852, USA).

The price of the volume is $200.00 plus $5.00 shipping and handling main volume and all 1989 Supplement if ordered from Dec. 31, 1989. After January 1990, the price will be $250.00 plus $5.00 shipping and handling, main volume and all 1990 supplements.

TRANSDERMAL NICOTINE PATCH — A NEW AID TO HELP SMOKERS

'Nicolan' a novel transdermal patch has been recently developed by Elan Corp. and an application has been filed with FDA in USA. This is the first drug device in the world developed for curbing the smoking habit.

Nicolan maintains 24 hours nicotine plasma levels comparable to average daily cigarette smoking. Advantages cited for the patch over oral thereby include continuous delivery even during sleep, freedom from unpleasant taste, avoidance of potential gastro intestinal side-effects and avoidance of variables such as dozing frequency and chewing rate.

Clinical trials at Mayo Clinic (Rochester, Minn) revealed that the 'Quit' rate among smokers using the patch was twice that of smokers using a placebo patch. The worldwide market for products to help smokers kick out the habit was estimated at more than $900 million in 1988. Elan Corp has licensed the product to Warner Lambert & Co. for marketing Nicolan as a prescription product.

A STRONG EVIDENCE FOR HIGHER DAILY INTAKE OF VITAMIN C

For many years, the recommended daily intake of vitamin C (ascorbic acid) has been linked to the prevention of scurvy. A recent research paper by Dr. B. Ames and his colleagues indicates that the daily intake should be doubled.

The researchers postulate that vitamin C plays an important role in the body as an antioxidant. This role has

formerly been obscured by the function of vitamin C in maintaining connective tissue such as collagen. The researchers show clearly that ascorbic acid or its salts can mop up oxidising agents. As we are all subject to oxidising agents either generated by the body's own metabolic processes or from the environment, perhaps a further look at the recommended daily intake should be undertaken.

Further, in poor countries like India where the citrus fruit and vegetable consumption is poor, there is still far more essential to upgrade the recommended daily intake of this essential vitamin for better public health. (*Proceedings of the National Academy of Sciences*) (Vol. 86, 6377-81).

RESEARCH CONFIRMS THE SIGNIFICANCE OF VEGETABLE FIBRE IN HUMAN DIET

The alcohol insoluble fibre residue in various vegetables, such as carrots, cabbage, broccoli and onion, has been shown to bind with dietary onions including chenodeoxycholate. The binding of bile acids and fatty acids to vegetable fibre occurs through salt linkages, probably involving the calcium pectate of the plant cell wall.

This binding could be of importance to health by lowering blood cholesterol levels and also by reducing the risk of colon cancer. A good reason for eating more vegetable fibre. (*J. Agric. Food Chem.*, 1989, 37, 1343-7).

SUCROSE POLYESTER (SPE) — A NEW FAT SUBSTITUTE

Sucrose polyester (SPE) is a new fat substitute that contributes no calories because it is not absorbed by the gut. A recent article in Food Technol. describes its benefits and problems SPE is a mixture of C-6, C-7 and C-8 esters formed by the reaction of sucrose with long chain fatty acids. Although has the taste and consistency of table oils, it is not hydrolysed by th olytic enzymes in the intestinal t

One positive side-effect of its the absorption of bile acids decrease cholesterol production in the same way as does oat bran. In SPE has lowered blood cholesterol centration by as much as 68%. studies showed only minor gastroi tinal side effects. (*Food Technol,* p.p. 42, 93).

FDA APPROVES A NEW BL CLOT-DISSOLVING AGENT USA

The Food & Drug Administr (FDA) in USA has approved joint keting of Eminase brand of anistre by Smith Kline Beechem and Up Co. to dissolve blood clots in coro arteries after heart attacks.

The drug is a complex of plasm gen with anisoylated streptoki Slow hydrolysis of anisoyl deriv after a single injection frees the a site of streptokinase, which then verts plasminogen to plasmin. Pla dissolves clots by cleaving cross-li fibrin.

The new agent joins the streptoki of Hoechst Roussel Pharmaceut and Kabivitrum, the tissue plasmin activator (TPA) of Genentech, and urokinase of Abbott Laboratories, w are clot-dissolving agents given by s intravenous infusion.

Of the several millions of people suffer heart attach yearly, several t sands die before getting to the hos or arrive too late to benefit from dissolving agents. Ease of giving nase in single injections may lead t being used sooner. For example, it c be administered by emergency ro and small hospitals. (*C & EN*, 12/ p. 27).

Science Briefs

)LAR REFRIGERATION FOR RESERVING DRUGS, VACCINES

A solar photovoltaic refrigeration stem has been developed by Tungabdra Steel Products Limited, Karnaka, to preserve drugs and vaccines.

The refrigeration principle used in the Solar Vaccine Saver VR100" is ique in that there are no moving parts, otor, compressor or the working fluid r producing refrigeration effect. The stem uses a solid state thermoelectric odule for pumping out heat, thereby oducing cooling effect.

The electrical energy required is suped by direct conversion of solar ergy into electrical energy by photoltaic modules provided with the stem.

The system comprises 120Wp PV odule driving thermoelectric module 60 Watts capacity and is backed up th electrical energy storage. Stored ergy operates the system during night d cloudy weather conditions, ensurg a stable temperature for the drugs d vaccines stored inside (maintained tween 4 to 10 degrees Celsius). It can ld four kg of vaccine and drugs.

The refrigeration chamber is moulded such a way as to keep down energy ss and provide a maintenance-free stem.

Energy storage is handled by a sealed type lead acid battery charged and scharged through an electronic regutor with built-in controls for preven on of overcharging, deep discharging, ort-circuit protection and protection ainst polarity reversal.

IND ELECTRIC GENERATOR

A 55-kilowatt wind generator has en developed by Bharat Heavy Eleccals Limited, Tamil Nadu Electricity Board and Gujarat Energy Development Agency.

The wind electric generator comprises a rotor fabricated from three FRP blades, each 7.5m long, mounted on a welded hub which is in turn connected to the shaft through an expansion coupling.

The shaft is supported on a platform known as the "Nacelle" which also includes the gear box and an induction generator which converts the kinetic energy of the rotor into electrical energy for feeding into the grid. The Nacelle is free to rotate in the horizontal plane in order to align the rotor to the prevailing wind direction. This is done by a "yawing" mechanism which is automatically controlled by a yaw motor.

The entire system is mounted on a lattice type tower structure at a height of about 25m. in order to avail good wind speed. A microprocessor-based control system has been provided for automatic startup, operation and protection of the machine.

TECHNIQUE TO UPGRADE SHEEP SKINS

The Central Leather Research Institute, Madras has developed and standardised a method for upgrading low-grade sheep skins for the garment industry.

The new technique is based on differential uptake of dyestuffs on the grain and snuffed portion to produce a twotone effect. The low-grade full chrome leathers are suitably processed to receive the embossing effect with prints and snuffed at appropriate stages. Subsequent setting and dyeing results in two-tone grain sueded effect.

Feedback received from samples sent to the United States and Hong Kong is highly encouraging and the process technology is available for release to Indian tanners.

BOTROPASE HELPS WOUND HEALING

Botropase, a systemic blood coagulant, promotes all phases of tissue repair, a finding that may have bearing in surgical operations.

Doctors at the Kasturba Medical College, Manipal, Karnataka, evaluated the usefulness of systemic haemocoagulants like Botropase and local ones like thrombin and fibrin on blood coagulation which is a preclude to wound healing.

Blood coagulation, inflammation and tissue repair are all intricately linked and many surgical conditions like capillary action and cardiac surgery require the administration of procoagulants and anti-coagulants.

The Manipal team studied the effects of Botropase, fibrin and thrombin on various properties of wound healing — for example, physical factors such as wound breaking strength and wound half-closure time, biochemical features like granuloma-hydroxyproline ratio and hexosamine content, as well as histological attributes of wound healing in experimental rats.

The doctors found that Botropase promotes wound healing by increasing the wound breaking strength, the total collagen content and rate of wound concentraction, and accelerating epithelization. Local application of thrombin and fibrin had no significant effects on healing although thrombin did delay wound contraction, a report by Dr. K.V. Ramesh and co-workers in the "Indian Journal of Experimental Biology" said.

NAL's NEW SOLAR SELECTIVE COATING

At one of the numerous nooks and corners of the National Aeronautical Laboratory, Bangalore, lies a black and

gleaming solar water heating system that can, even on very cloudy days, provide piping hot water.

The water-heating system uses a new solar selective coating technique developed at NAL that not only helps to collect and convert solar energy into heat, but also manages to heat the water to temperatures higher than 80 degrees Celsius.

The system has a flat plate collector with a special black coating, according to a report by NAL. Simple black enamel paint is a good absorber, but unfortunately, after a point, it is also a good emitter. What is needed is a black coating with high absorption and low emittance, at least at the temperature of operation of the collector. This technique is called "selective coating".

Black chromium, an optical composite of chromium metal and chromium oxide, is perhaps the best available selective coating. But it presents a basic problem — the black chromium can only be produced by electrodeposition as electroplating is not easy. This is because the deposition has to be carried out at a temperature lower than 20 degrees Celsius, to ensure high absorbance and low emittance. This means that in India electrodeposition must necessarily be effective under refrigeration.

A second problem is that the coating has to be carried out at current densitities that are more than three times the normal current density used for chromium plating.

These limitations can be overcome by choosing the right additives to get a marvellous black coating. All black chromium baths are based on chromic acid and certain catalysts. An electron spectroscopic chemical analysis (ESCA) of the NAL black chrome deposits revealed two interesting facts: that they contain carbon not only on the surface but also in the bulk of the deposit and that these deposits also show the presence of nickel oxide on the surface and subsurface layers.

The presence of the carbonaceous matter means that some of the additives added to the plating bath are organic. Nickel oxide is probably getting formed due to the interaction between nickel difussing into the substrate, and an unstable chromium oxide in the deposit. Since the NAL black chrome is free from carbon and does not contain nickel oxide even in the layers well below the surface, the deposit is stable even on exposure to solar energy.

Hence the coating assures stable absorptivity and emission in service. Scientists believe this to be the reason why the NAL coating has not deteriorated significantly in the last two years, while selective black chrome deposits available in the market begin to lose some of their blackness and acquire a tinge of grey after being exposed to the sun for some time.

The NAL bath compares favourably with some of the well-known similar baths, although the heating is a little slow. A recent study on a 400-litre water heating system showed that at 9.00 a.m., the water temperature was 28 degrees Celsius; at 11.00 a.m., it had climbed to 50 degrees Celsius; at 1.15 p.m., it was only 71 degrees Celsius, and finally at 3.00 p.m., the temperature rose to a near maximum of 80 degrees Celsius. But the study also showed that even overnight, the drop in temperature was not significant.

So, although it is not an instant water heating system, it can be ideal as a water heating system for a bathroom. NAL scientists believe that at a time when there is an acute power shortage in the country, one can save power for more important applications by using such gadgets. Statistics show a 100-litre system can save eight units of power daily and a 25,000-litre system about 1500-2000 units daily. The systems are being built and sold by Soladur Systems (India) Pvt. Ltd., based on the N black chrome process. But NAL provides help in some areas. For ex ple, the electroplating of the cop fincopper tube elements is still do NAL. Eight such elements are use make the standard panel for flat p collectors.

The cost of the NAL black chrom plating technology comes to a lump premium of Rs. 50,000. There is, h ever, no recurring royalty and license is non-exclusive. The payb time for a 100-litre heating system be about three years, and after as long as the sun shines, the powe free.

SHOT IN THE ARM FOR MON CLONAL ANTIBODY PRODUC TION

A novel cloning system may per researchers to produce the entire a body repertoire of an animal in the b terium Escherichia coli, reports journal "Science".

The technology is being developed the Research Institute of Scrippes Cli in La Jolla at California and indep dently at the MRC Cambridge Lab atory.

The new way of generating speci antibody molecules may render curre methods of producing monoclonal an bodies obsolete, the journal said. Mon clonal antibody technology invented years ago has found widespread app cation in basic research and medic diagnosis.

Monoclonal antibodies are produc by cells, called hybridomas, that ha to be grown first in laboratory dishe usually for several months, and then mice, it said. After this process, on one, or at most a few monoclonal an bodies with the desired specificity m result. A great deal of difficulty has bee encountered in producing human mon clonal antibodies, which may be esse

al for many potential therapeutic applications, the journal said.

The new method has many advanages over the earlier process. For one, is very fast, taking only a few days to get specific antibody clones, and it an be used to make human monoclonals. Quoting an immunologist, the journal said the technique avoided the use of mammalian cells and that E.Coli cells could be grown by the tonne.

The research is aimed at producing antibodies that can catalyse biochemical reactions, such as enzymes do, and the target is to tap the essentially unlimited diversity of antibody structures to make enzymes with specificities normally not found in nature. The California group has successfully produced catalytic antibodies by standard hybridoma technology, but only in very small numbers, the journal said. The probability of finding an antibody with high catalytic activity depends on the number of variants produced, it quoted a researcher as saying.

However, there was a difficulty associated with the body structure of the antibody. An individual antibody consists of four proteins — two identical heavy chains and two identical light chains — that together form a single Y-shaped molecule. The arms of the Y form the sites at which an antigen binds to the antibody. These sites consist of segments from both the light and heavy chains. But that means that genes for both a heavy and a light chain must be introduced into an E.coli cell if the bacterium is to make a complete antibody.

This problem was surmounted by the Cambridge group early last year. The group showed that it could obtain antibody-producing genes from hybridoma cells by using the polymerase chain reaction (PCR) to amplify the genes. The amplified genes could then be cloned in E.coli so that the bacteria make the antibody proteins, thereby eliminating the need to grow hybridomas, the journal said.

Subsequently, the PCR-assisted cloning was used to make "libraries" of the extensive repertoire of gene segment encoding the antigen-binding portions of mouse heavy chain proteins. A library, in this context, means a depository of gene clones from which individual clones can be withdrawn.

The next step was to combine the genes for the antigen-binding portions of the heavy and light chain proteins in the same clones, the journal said. Separate libraries of the gene segments encoding the antigen-binding portions of light and heavy chains was made. Next the heavy and light chain gene segments in the DNA of a virus that infect E.coli were combined. An infected bacterium would then contain genes to make both components of the antigen-binding portion of an antibody, and a very large number of light-heavy chain combinations could be produced.

A rapid method was devised for screening this multitude of clones to pick out just those that produce antibody fragments with the desired specificity.

So far the researchers have not produced complete antibody molecules, the journal said. However, the viral vector that the researchers are using to transplant the antibody genes into the bacteria can accommodate longer gene segments, so it should be possible to make full-size antibodies if they are needed.

BOOST FOR SOLAR POWER

A new photovoltaic technique makes it possible to convert sunlight into electricity more efficiently and cheaply.

Developed by British Petroleum, its solar company has now produced prototype power modules using thin semiconductor film in a relatively inexpensive manufacturing process as well as improved silicon solar panels, according to the newsletter "Spectrum". While conventional silicon solar cells need to be several hundred microns thick, BP solar has devised ways of electro-depositing a one-to-two micron film of a semiconductor known as cadmium telluride (Cd Te).

A similar technique can be used to create a film of cadmium sulphide (CdS). By depositing CdE over a CdS layer on a tin oxide-coated glass substrate and fitting a back metal contact, a compact low cost thin film solar cell is constructed.

Initial modules are 900 square centimetres, and the company is continuing developmental work on uniform film deposition over large areas. The module is divided into 35 segments which are connected in series enabling electrical power to be derived at low current but high voltage.

Thinner front metal grid lines shade less of the cell surface area and enable more current to be produced. Grid line electrical resistance has been reduced by using deep, full density metal lines in contact with heavily-doped silicon, instead of lines screen-printed on lightly-doped silicon.

At the same time, light-trapping and anti-reflection coating ensure high light collection efficiency, while a special treatment also ensures improved response to light and increased voltage generation.

MEASURING RED BLOOD CELL DEFORMATION

The Tokyo Institute of Technology has developed an apparatus for measuring the deformation of red blood cells, reports the journal "Techno Japan".

The apparatus is provided with a thin film of silicon nitride 0.2 m thick, in which small holes ranging from 0.7 to 2 m in diameter are made by means of a semiconductor fine-processing tech-

nique, so that the time required for a red blood cell to pass through each hole can be measured. The apparatus is capable of reproducing conditions similar to those created in an actual spleen, which controls the quality of the blood supply and produces certain blood cells in the body, since the size, shape, position, and number of the holes in its film can freely and accurately be determined.

In addition, it has the following advantages: parallel measurement can be carried out by means of a graphic data processing technique. The differences in time observed between red blood cells when they pass through the holes varying in size and shape can be measured simultaneously; and measurement of the deformation of red blood cells helps facilitate diagnosis of diseases and promotes biotechnology studies, the journal said.

ANTIBODIES TO INCREASE YIELDS

Food researchers in the United Kingdom are evolving two novel strategies for increasing milk yield and carcass weight in cows and other livestock, reports the journal "Biotechnology". Exploiting the animals' own immune systems, the techniques may offer more convenient and acceptable alternatives to using anabolic steroids now banned from animal husbandry in the European Economic Community or bovine somatotropin (BST).

Both approaches hinge on introducing anti-idiotypic antibodies that remain in the blood-stream for long periods, thus obviating the need for the repeated injections necessary with BST, the journal said.

Working at the Hannah Research Institute (Ayr, Scotland), David Flint and his colleagues have learned how to induce animals to make antibodies that mimic the structure and action of BST. By injecting BST into rabbits, they have generated anti-BST anti-bodies which, injected back into cows, provoke the formation of anti-idiotypic antibodies resembling BST in shape.

These antibodies are specific to BST. They bind to its receptors, but not to those for other hormones such as insulin and prolactin. Both the mimics and BST itself promote growth when injected into rats deficient in their own growth hormone, it said.

Meanwhile, at the AFRC Institute for Grassland and Animal Production (Hurley, Berks), Isabel Forsyth and colleagues have found that monoclonal antibodies directed against BST can enhance, rather than impair, its biological action.

In one series of experiments, lactating sheep given growth hormone increased their milk yield. When given an identical dose of hormone complexed with monoclonal antibody, however, they produced nine per cent more milk over the same treatment period. Presumably, the antibody promotes the action of BST by altering its binding to the BST tissue receptor, the journal said. The researchers next set out to identify the epitope of growth hormone associated with the enhancement, and to raise antibodies against it.

Such antibodies may derive from more than one B lymphocyte and thus not be strictly monoclonal, but may behave as such. Their presence in an animal's circulation should thus enhance the biological activity of its own hormone.

Preliminary results indicate that this will be feasible. In sheep, Forsyth and co-workers have raised an antibody against an epitope of growth hormone, and given a partially purified version of it to another group of sheep, the journal said.

They found that the antibody combined with circulating endogenous growth hormone and increased its bioactivity. Compared with untreated c[illegible] trols, the animals showed reduced [illegible] synthesis.

The Hurley team believes that a s[illegible] egy based on one or two injection[illegible] small amounts of hormone epit[illegible] where both harmone and enhanc[illegible] antibody are produced by the ani[illegible] itself, offers practical and regulat[illegible] advantages over repeated injections [illegible] large quantities of exogenous h[illegible] mone, the journal said.

LEVITATION METAL MELTI[illegible] METHOD

Japan's Toshiba Corporation h[illegible] developed a new melting method [illegible] melt metal in large quantities witho[illegible] using a crucible, reports the journ[illegible] "Techno Japan". The levitation me[illegible] ing method is a technology to float [illegible] metal placed in a high frequency coil [illegible] air by the interaction between the cu[illegible] rent flowing through the high frequenc[illegible] coil and the current in metal induced b[illegible] such current.

The metal is then heated and melte[illegible] through heating which is generated b[illegible] the induced current flowing through th[illegible] metal at the same time. If the weight o[illegible] the metal is more than 10 kg. or so, [illegible] becomes difficult to float up molte[illegible] metal stably only by the electromagne[illegible] tic force. In this case, a part of th[illegible] bottom of the metal is supported b[illegible] unmolten metal.

The levitation melting method requires no crucible which is the container of molten metal, so there is no possibility that molten metal is contaminated by the material of the crucible. Therefore, chemically active metals such as titanium, zirconium, niobium, etc. can melted. By this melting method, metal vapor can be generated to overheat molten metal to high temperatures. It can be used as a metal vapour generation source, it said.

— P.T.I. Science Service, Jan. 16-31, 1990. (All items)

Geotextiles — A Review

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Geotextiles have been defined as woven or nonwoven ›rics having applications in civil engineering, such as inter- :ing of the fabrics with soils to give reinforced structures g. road bed reinforcement) or enhancing hydraulic prop- ;ies for water transport. Geopolymeric substances may be ıssified depending on their use as follows:

ructure	Use
Geomembrane	Liquid containment Liquid barriers
Geotextiles	Layer separation Drainage Stabilisation Reinforcement
Geogrids	Reinforcement Load bearing element
Geocomposite	Multifunctional composites of the above structures

Depending on the durability of these substances, they are assified as follows:

ructure	Form	lifetime (Years)
Simple	Nonwoven Woven	$\leqslant$ 2-5
Complex	Nonwoven Woven	25-100
	Fibrous arrays Grids Linear	> 75

Geotextiles have to fulfill certain requirements. These ıclude the following: 1. They must be penetratable by roots, e., interstices must be able to be enlarged in such as way ıat the plant roots can pass through them without constric- ion and without being detrimental to the geotextiles. 2. They ıust permit material exchange between air and soil without hich plant growth is impossible. 3. They must have at least ıe tensile strength of the plant roots. 4. They must, in the ıitial growth phase, retain erosion material and must not be amaged by rock debris or boulder detritus. 5. They must llow both rain to penetrate the soil from outside and excess ater to drain out of the earth without erosion occurring in ıe earth or the geotextile becoming blocked. 6. Geotextiles ı combined use with plants need only to be durable in the ıedium term.

For ensuring the durability of geotextiles, the following objectives should be achieved: 1. The nature of the degrading agencies (sunlight, rain, wind, atmosphere, pollutant gases, and particulates) present within a particular geotextile site environment should be identified. 2. The physical and chemical effects on the fibre and polymer component structures and their properties should be understood. 3. Stabilisers for each fibre/environment combination should be selected. 4. The interactions following combined agency attack should be understood and quantified. 5. Accelerated ageing tests should be generated, along with real life exposure tests, enabling realistic life time predictions to be made.

The principal degrading agencies and their effects on geotextiles are given in Table 1.

Table 1
Principal degrading agencies and their effects on geotextiles

Agency	Effect
1. Physical	
a. Stress	Rupture, creep
b. Wind	Removal of volatiles
c. Water	Removal of additives, plasticisers
d. Solvents/hydrocarbons	Removal of additives, swelling embrittlement
2. Chemical	
a. Heat (+ O_2)	Chain scission
b. Light (+ O_2) (UV)	Chain scission, oxidation, Loss in tensile properties
c. Weather	Combined effects of light, heat, wind and water
d. Water	Chain scission, Loss in tensile properties
e. General chemicals	General degradation of polymer structure
3. Microorganisms	Hydrolytic and oxidative polymer chain scission. Loss in tensile properties.
4. Radiation	Chain scission, crosslinking, loss in tensile properties.

In addition UV exposure of a geotextile during transportation, storage and installation can sensitise the component fibres to hydrolytic damage after installation. The different degrading factors may act in combination (thermal oxidation, photo-oxidation, acid and alkaline hydrolysis etc.) after instal-

lation. Weathering involves cyclical exposure of the geotextile to physical and chemical effects of sunlight, rain, wind and atmospheric pollutant gases and particulates.

Fibre selection

Polyethylene, polypropylene, polyester, para-aramid, polyamide, ramie, jute etc. are considered for being used in the making of geotextiles. Chemical inertness, high strength, high modulus, and extra creep resistance are the essential properties of geotextile fibres. After chemical inertness mechanical and dimensional stability is of next greatest importance. Creep resistance receives considerable attention, since this property determines the maximum loading level that may be safely applied to a geotextile in situ. Creep increases in the order para-aramid < polyester < polyamide < polypropylene. Since creep is associated with the less ordered regions of the fibre strucutre, the order corresponds to the parallel decreased magnitude of the respective second order transition temperature (Tg) (340°, 80°-90°, 40°-50°, and 20°C respectively).

The properties of some of the fibres vis a vis their suitability or otherwise in the manufacture of geotextiles are discussed below:

a. Olefins (High density polyethylene and polypropylene)

Both these fibres are creep-prone because of their low Tg values. However, their purely hydrocarbon chemical inertness is an advantage. They are vulnerable to permeation and swelling by aromatic solvents (toluene and xylene). Their resistance to diesel and lubricating oils (aliphatic solvents) is acceptable. HDPE is susceptible to stress-crack and hence fails in the presence of nonsolvents. Use of copolymeric HDPE variants having high molecular weights and narrow distributions reduces the undesirable characteristics of polyethylene (Tensar Products are such crack-resistant HDPE).

Resistance to chemical ageing is poor if oxidising agents are present, which is especially true for polypropylene (the tertiary carbon atom is particularly vulnerable to thermal and photo-oxidation. However, effective antioxidants and UV radiation stabiliser systems are available. While selecting these stabilisers leaching during use should be considered. Thus UV stabilisation required may range from a moderate level for North European use (o-hydroxy benzophenone and benzotriazole may be adequate) to the extreme product needed for tropical protection (more effective and and expensive hindered amine light stabilisers would be used). Carbon black is one of the most effective light stabilisers. Hence its presence is found in many polyolefin-containing geotextiles.

Soil burial studies show that except for very low molecular weight components present, neither HDPE nor polypropylene is attached by micro-organisms, although certain additives and fillers may be vulnerable to this attack. Thus with the use of suitable stabilisers, geotextiles based on these polyolefins should have acceptable lifetimes for most of the applications. For example, polypropylene tapes subjected to aerated seawater should have lifetimes of 30-50 years and in general construction fields of application, 100 years would be expected.

b. Polyester fibres

High strength, modulus, creep resistance and general chemical inertness make polyester fibres a suitable fibre in geotextiles. However, it is attacked by polar solvents, like benzyl alcohol, phenol, m-cresol etc. It is resistant to diesel and other fuels and oils. It is sensitive to hydrolysis in acidic and basic media. This poses long term durability problem in aqueous environments over the pH range 3-10, which are the typical values encountered in natural and polluted soils. Even though it is a hydrophobic fibre, it is penetrated by water. Soil burial tests have shown that after a period of seven years, negligible strength losses were observed.

Based on accelerated ageing tests it is concluded that under the conditions of pH range 7-10, lifetimes of the order of 50 years may be expected. Resistance to UV radiation of the fibre is not exceptional and cannot be easily improved. Hence its storage and installation should be undertaken with care to avoid unnecessary exposure to light.

c. Polyamide fibres

Nylon 6 and nylon 66 have found very little use in geotextiles. These high strength, tough fibres have lower moduli than polypropylene and polyester fibres and are more vulnerable to UV attack, depending on their delustrant type and melt extrusion/antioxidant characteristics. Like polyester, they are prone to hydrolysis. They are quite resistant to neutral and weakly alkaline conditions, but are attacked by acidic solutions. Soil burial results in strength losses. Hence their use in geotextiles for long lifetimes is limited.

Poly (para-aramid) fibres like Kevlar (Du Pont) having very high creep resistance and very high strength and moduli as well as superior solvent and hydrolysis resistance compared with nylon 6 and nylon 66 have attracted interest in their use in high performance geotextiles and geogrids. Vulnerability to UV attack is one of their disadvantages. Hence these should be protected from such exposures during storage, transportation and installation.

d. Ramie fibres

These are subtropical bast fibres. The ready-to-cut stalks of the plants are cut 3-6 times a year. The leaves are fed to the animals and the bark and pith of the stalks are returned to the fields as fertiliser. The remaining material (3-6%) contains fibres and approximately 25% gum or glue. The fibres have silky lustre, are snow-white in the unbleached condition

and can easily be dyed. Ramie is very strong and durable. It has the highest tenacity of all plant fibres. The fibre consists of almost pure cellulose and is resistant to moisture and rotting bacteria. The wet strength is 130% of its dry strength. The resistance to rotting can be influenced by treatment of the fibre. Untreated ramie rots in about one year. With environmented conservation agents the decaying time can be increased to three years.

Properties

A geotextile is a flexible plane structure of fibres. The small bending stiffness of the plane structure of the fibres is due to the flexibility of the fibres, the ability of the fibres to move in relation to each other and the limited thickness of the structure. The properties of the geotextile, therefore, depend on those fibres and of the fabric construction, i.e. the structure of the geotextile.

A geomembrane is a thin two-dimensional sheet of a material with very low permeability. A geotextile has the same permeability of sand. It is flexible and is made from synthetic or bituminous products. It may be strengthened with a fabric or a film. Geomembranes are impermeable to gases and liquids, making them ideal for forming waterproof and gasproof barriers between adjacent bodies of soil or soil and fluid.

Resistance properties of some geotextiles are given in Table 2.

Table 2
Resistance of various geotextiles

Polymer	PP		PE		PET	
Resistance towards	Short	Long	Short	Long	Short	Long
1	2	3	4	5	6	7
Dilute acids	++	++	++	++	++	+
Conc. acids	++	+	++	+	0	-
Dilute alkalies	++	++	++	++	++	0
Conc. alkalies	++	++	++	++	0	-
Salt (Brine)	++	++	++	++	++	++
Glycol	++	++	++	++	++	0
Mineral oil	+	0	+	0	++	++
Micro-organisms	++	++	++	++	++	++
UV light (Polymer stabilised)	++	+	++	+	++	+
UV light	0	-	0	-	+	0
Dry heat (≤ 100°C)	++	+	++	0	++	++
Steam (≤ 100°C)	0	-	0	-	0	-
Moisture absorption	++	++	++	++	++	++
Detergents	++	++	++	++	++	++
Tendency to creep	+	0	+	0	++	++

\- Not resistant
0 Moderate
\+ Passable
++ Good
Short - During installation
Long - During usage

Nonwoven bonded fabrics are classified based on the drawing up of the web fibres according to a. the length of the fibre (spun-bonded and filament web), b. the method of production (mechanical, aerodynamic, hydrodynamic, electrostatic) and c. position of the fibre (longitudinal, horizontal and random arrangement).

These are further sub divided:

A. According to type of fibre/fibre bonding

1. Friction bonding (by shrinking, pressing and fulling).
2. Frictional bonding and interlocking (by needling looping and swirling).
3. Adhesive bonding (with liquid or solid bonding agent).
4. Cohesive bonding (partly dissolving, welding).
5. Multiple bonding (prebonding with 1 and/or 2 or 4; main bonding with 3 or 4.

B. According to spacial arrangement of the bonding areas

1. Fully bonded (3-dimensional, equally distributed).
2. Surface bonding (only layers close to the surface are affected by the bonding agent).
3. Partial bonding (bonding agent supplied to a pattern).

Some details of some trade products are given in Table 3.

Table 3
Some details of geotextiles

Tradename	Manufacturer	Brief description
1	2	3
Polypropylene		
1. Corovin	Benecke (W. Germany)	Needled, thermally bonded
2. Fibertex	Crown-Zeller bach (USA)	Docan method

1	2	3
3. Typar	Du Pont (USA)	Thermally bonded
4. Floratex	ICI (UK)	Core-skin bicomponent (PP/PA)
5. Terran	ICI (UK)	Core-skin bicomponent (PP/PA)
b. Polyethylene		
6. Tyvek	Du Pont (USA)	Heat bonded and calendered
7. Terran	ICI (UK)	Bicomponent (See 5)
8. Sualen PT	VEB (E. Germany)	Presumably needled
c. Polyester		
9. Bidin	Rhone-Poulenc (France)	Needled
10. Unicel	Teijin (Japan)	Filament web
11. Lovesheet/ Matrix	Unitika (Japan)	-
12. Trevira spunbond	Hoechst (W. Germany)	Thermally bonded
13. Reemay	Du Pont (USA)	Filament web bonded by heat and pressure

Properties of polymers and binding agents

The inner phase of polymer dispersion (polymer) determines the properties relevant to the making of the nonwoven bonded fabric and also influences the behaviour of the bonding agent during drying, i.e. evaporation of water. Thermosensitivity and crosslinking are the two important properties of the dispersion.

Crosslinking

Crosslinking increases tne resistance of the bonding film to water and organic solutions. In addition, it increases the tensile strength and elastic stretchability of the bonding agent, but tear strength and stickiness are decreased.

An important form of crosslinking of nonwoven bonded fabrics is achieved by N-methylol groups (heat reactive groups) which react with one another in the presence of hydrogen ions. Such crosslinking takes place during drying after the application of the bonding agent. When N-methylol groups are added to the polymer dispersion in the form of aminoplast precondensates (amino aldehyde or melamine formaldehyde based) this creates external crosslinking. If N methylol groups are already included in the polymer at the emulsion polymerisation stage by suitable monomers like N-methylol acrylamide, nothing further can be done and crosslinking (self-crosslinking) reaction begins during drying. However, this reaction may begin at the polymerisation stage as well.

Acrylates (copolymers of acrylic acid derivatives)

These are very important in the production of nonwoven bonded fabrics. In a narrow sense, it covers only acrylic acid and methacrylic acid esters. Differences in contents and amounts account for, there being about 30 different monomers to provide the basis for a large number of acrylate polymer dispersions with a wide range of properties. There are completely water-soluble acrylates and those completely insoluble in water. Their hardness varies from extremely soft to very hard. The most frequently used monomers are:

1. Acrylic acid ester or methacrylic acid ester. These are not soluble in water and dissolve in only a few solvents.
2. Styrene.
3. Acrylonitrile/methacrylonitrile (These polymers swell very little in water).
4. Vinyl acetate (This polymer is completely insoluble in water, but soluble in certain organic solvents like acetone).
5. Acrylic acid/methacrylic acid (These polymers too are insoluble in water; their ammonium and alkali metal salts are water soluble).
6. Acrylamide/methacrylamide with or without N-methylol groups.

In general because of the greater degree of crosslinkages in the molecular chains of the acrylic acid derivatives, the bonding agents made from them produce softer films than those made from methacrylic acid derivatives.

Polyacrylate dispersions

These esters are made from acrylic/methacrylic acid with all the common alcohols: ethyl, butyl, and 2-ethyl hexyl esters of acrylic acid and methyl ester of methacrylic acid are very important. As the length of the aliphatic side chain (of the ester) increases, the bonding agent becomes softer and more soluble in organic solvents. The surface becomes more sticky and their hydrophobicity is more pronounced. High resistance to light and weathering are their outstanding properties.

Vinyl polymers

Like acrylates, vinyl polymers include a wide range of chemical substances and exhibit numerous and varying properties. The bonding film can be made soft or hard or brittle. Their characteristic properties are 1. Thermoplasticity over a wide temperature range, in which the polymers fuse and melt, 2. The extreme hardness of the films made from homo

polymers and the relatively strong adhesion to most fibres.

Softeners are usually needed because of the extreme hardness of vinyl homopolymers. In some cases there is internal softening by copolymerisation with special monomers. Greater softness can often be achieved by using additives (dialkyl phthalates like dibutyl or dioctyl phthalates) or organo phosphates to extend the distance between the linear molecular chains and thus reduce the hardness.

Application of geotextiles

Modification and improvement of soil (road, river banks etc.) by adding extraneous materials has been done by man for the last several thousands of years. However, the use of fibres and their structures for the purpose has been practised for the last two or three decades only. Now it is a major field of application for the fibres. The development, production and use of textiles for such purposes hence called geotextiles) have taken place mainly in USA, Western Europe and Japan. The first two manufacture and use 40% each of the world production of geotextiles. This has not spread to other countries to substantial extent, mainly because of the lack of experience and understanding of their use and high cost of import. In the countries mentioned above, the market was only 10 million sq. m. in 1970, which rose to 100 million sq. m. in 1980 and is expected to cross the mark of 1 billion sq. m. in 1992.

Geotextiles made from synthetic fibres were first used in Netherlands. It was in 1953 that there was a catastrophic flood in that country resulting in innundating 150,000 hectares of the South-Western part. There were 2,000 casualties and 72,000 people had to be evacuated. This event initiated the famous Delta Works, which shut off all the sea arms situated between the Western Scheldt and the Rotterdam Waterway.

In the earlier days barrier constructions were done using clay and asphalt, concrete, synthetic membranes (jute impregnated with tar for small canals and ponds). Since jute decayed after some time, the barrier could not function subsequently. Nylon-reinforced membranes appeared in 1963, when reinforced bitumen was applied in a seal construction for the lock near Bonn. Later the first seal with synthetic fibres was used to seal the fresh water reservoirs in Zeeuvs Vlaanderen. A 0.15 mm thick low density polyethylene (ldPE) membrane was installed over an area of 50 hectares. The membrane strips were water-tight and were connected with an adhesion layer, and the membrane was subsequently covered with 0.5 m thick layer of soil.

UK River Embankment protection

The construction of a major tidal flood-protection causeway on a tidal estuary in UK provides an example of critical application of geotextiles in civil engineering works. Manstock Geotechnical Consultancy Services (Manchester) were retained to design a geotextile-supported embankment that could be constructed quickly, since the geotextile would reinforce the lower part of the embankment, preventing failure during the period when consolidation and strength increase of the subsoil would take place.

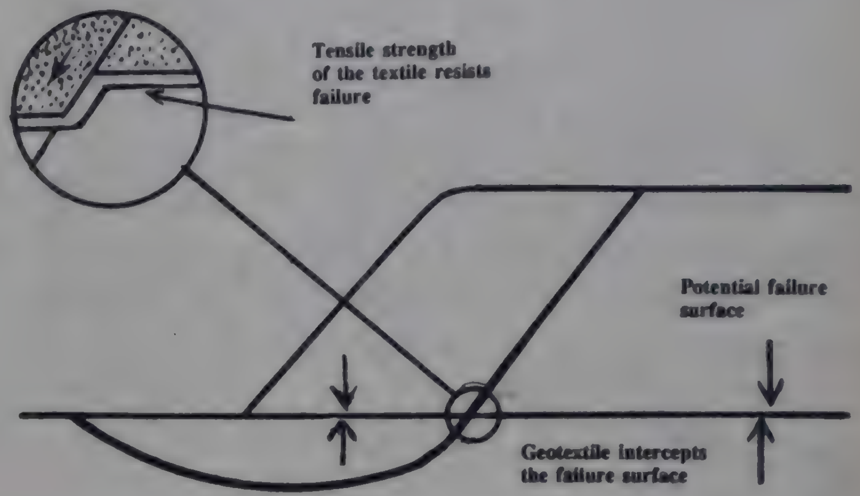

Fig. 1
The geotextile resists sand failure by exerting a tensile resistance to rotational forces

A 20-tonne/1m width polyester geotextile was selected on the following ground:
a. Polyester has a predictable long-term creep behaviour when placed under relatively high stresses.
b. Such products have been used for civil engineering purposes over many years and have a good track record.
c. Such products are competitively available in the UK.

This fabric presented a balance between the rate at which the compressed soil would increase in strength against the rate at which the stressed geotextile would creep to failure. If the soil did not consolidate and strengthen rapidly, then the geotextile would also fail. The expected rate of creep failure from polyester geotextiles in such situations is given in the following table.

Creepfailure of polyester geotextiles

Percent of ultimate failure load	Time to creep failure
50	10 Years
60	8 Months
70	1 Month
80	Several days

During the construction of the embankment, there would be stresses in the direction of construction, and the geotextile

had to be sewn together into a continuous piece. Though the weft strength of the geotextile was 4 tonnes/m, the sewn joints could just achieve 50% of the figure at failure. Therefore in the weft direction, the geotextile had an intrinsic strength of 4 tonnes/m. However, the actual working capacity is less than 1 tonne/m, since the joints could not be stressed at any level approaching the failure point. This led to the necessity of a very low slope angle in the direction of construction of the new embankment.

Another sewing problem arose at a very tight right angle bend in the causeway at a river junction. In principle it was necessary to have a 20 tonne/m wide geotextile laid at right angles to the axis of the embankment along the length. The problem was now to achieve it around a tight right angled bend, where the causeway bend had an external radius of 40m and an internal radius of 3m. The solution adopted was to cut and doubly overlap the geotextile layers such that there was always a radially effective full 20-tonne resistance around the bend.

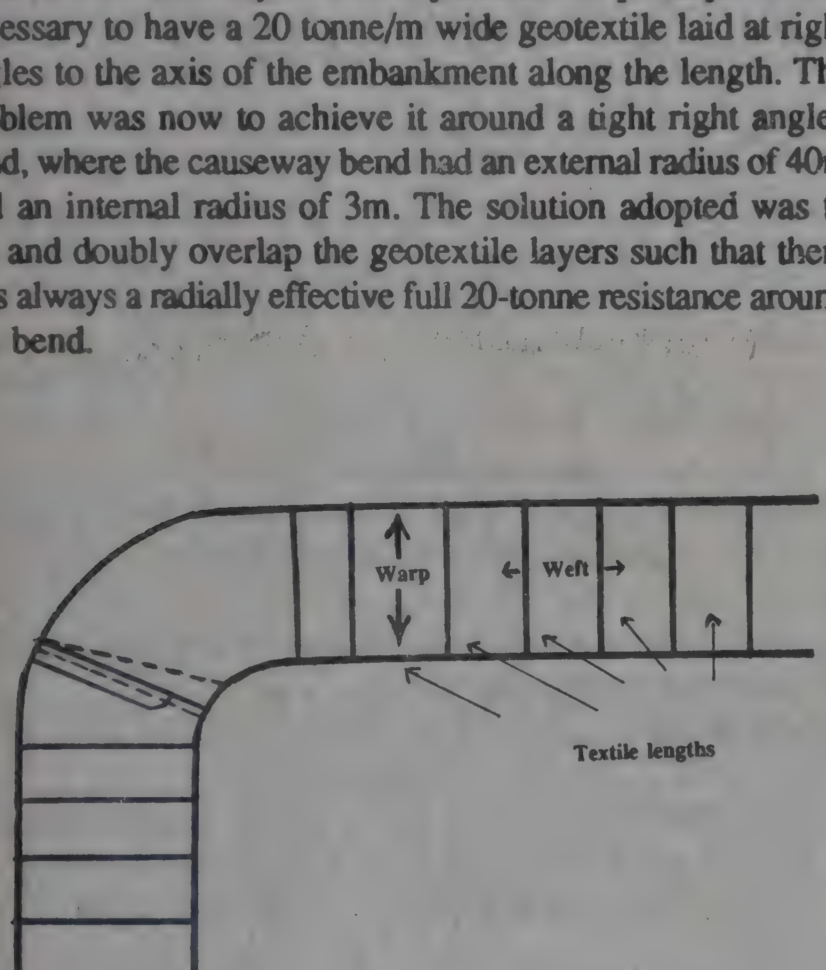

Fig. 2
Technique used for overlapping geotextiles at a tight bend

Finally, the embankment was subsequently constructed on schedule over a summer period, which was completely wet, on some of the softest soils in the UK. Without the geotextile layer, the embankment would have failed dramatically.

Nelton Ltd. (of UK) have developed a geogrid, defined as "a uniplanar polymeric grid structure, made from a perforated sheet, having square or rectangular meshes, each with oriented strands on at least two opposite sides, all the junctions being oriented". They are offering the grid structures under the trade mark Tensar, further described as "very high strength polymeric grid structures having outstanding long-term performance properties achieved by highly orienting the molecular structure of the basic polymer. The unique properties of the geogrid have been readily recognised and welcomed by the civil engineering industry.

Nelton (mesh strucutre), made in late 1950s, is produce in a single stage process by extrusion through counter-rotatin extrusion discs rather than by the traditional methods of weav ing or knitting. Nelton geogrids with apertures ranging in siz from 8-50 mm is intended primarily for soil stabilisation. Thi has the benefit of interlocking. Granular soils can pass throug the grid and interlock with it. In this case, a matrix is forme of soil and the geogrid. Pull out tests showed that the geo grid offered considerably greater restraining forces.

Their development work began in 1979 on a new proces for highly molecular oriented geogrids and products unde the name Tensar were marketed in 1981. These had greate strength than Nelton, which was a uniaxially stretched pro duct. Later biaxially stretched products developed the strengt of mild steel but without its corrosion effects. The junction of the polymer strands are similarly oriented i.e. they are full integrated with the grid, ensuring that there are no weak link in the structure.

Raw materials

The two main raw materials used in the production o Tensar geogrids are HDPE and polypropylene. The forme is used where long-term creep performance is required. Th quality of the material used is guaranteed for a lifetime o 120 years. Polypropylene is mainly used in biaxial grids an when heat set at 140°C, it can be used in asphalt reinforcement. Both these polyolefins are resistant to many chemicals naturally found in soils and are not attacked by fung and bacteria. They are stable to acids, alkalies and salts an are protected (with the use of suitable stabilisers) from degradation by UV light.

The light weight of the products (density, less than 1) made from them is an advantage for on-site handling of large quantities of the geogrids as compared with metal grids. In use the grid forms a rigid structure because of the interlocking of granules and other particles and its intrinsic rigidity to be suitable for vertical installations such are retaining walls o by itself as fencing. When used in road surfacing, it is possible to use less stone because geogrid makes a stiffer structure.

River bank reconstruction

Swiss Nat Co. Ltd. (Tullindustrie AG) have developed a geotextile, Terranet Type 50226 for reconstruction of a river bank in Switzerland. This raschet-knitted fabric consists of longitudinal high strength, UV-resistant polypropylene fibre yarns as warp and ramie yarns as weft yarns. Primarily, the geotextile prevents the newly built banks and sloping sections from sliding down. The fine mesh net (the appertures in the Terranet) allow the penetration of plant roots without constriction. After a time, when the root system attains a certain strength, the ramie component of the geotextile grid, rots

away to lean only on the warp polypropylene yarns. These take over the reinforcement of the slope (protection against erosion) until the plants have developed an additional root network. The ramie rots between 1 year to 3 years depending on its pretreatment and the plants are given sufficient room for further growth without detriment to the stability of the bank reconstruction.

Properties

The properties of geotextiles depend on the end-use of the products with diverse functions such as reinforcement, filtration and separation. For reinforcement, strength, extension under load and degradation with time are needed. Hydraulic properties such as permeability and porosity of the fabric are important properties for filtration. In the case of drainage, transmissivity (water flow in line) is the most important characteristic. A combination of the required properties for reinforcement and filtration are needed for separation. Long-term durability can be important depending on the end-use.

Geometrical aspects

Based on the composition, geotextiles may be subdivided into woven fabrics, staple fibre nonwovens, thread structures, mats and strip-mats, gauzes, grids and knitted fabrics. Width and length, thickness and mass/unit area play important roles in the choice of geotextiles in construction.

The maximum standard width available for woven and nonwoven fabrics is 5-5.5m. For most of the geotextiles, the length is limited by transport facilities and ease of handling on site (weight and the diameter of the rolls). Thus the length may range from 50 m to 200 m (depending on weight/unit area). The thickness of most of the geotextiles varies between 0.2-10 mm. The thickness is important for the following reasons:

a. to ensure sufficient impermeability to liquids and gases,
b. to ensure adequate resistance to mechanical forces, especially during the construction phase,
c. to ensure reliable techniques for joining the membrane sheets together, and
d. to allow the possibility of embossing the geomembrane to increase the friction between the membrane and the ground on which it is applied.

The weight per unit area of nonwoven geotextiles varies between 100 gm/sq. m. to 1000 gm/sq. m. with 100-300 gm/sq. m. being the most common. Woven fabrics can be heavier (100-2000 gm/sq. m.), but the greatest demand is in the range of 100-200 gm/sq. m. Lighter types are used as separators and heavier wovens for reinforcement and heavier nonwovens for filtration purposes.

By merely burying textiles, interesting results can be obtained. when a fabric is spread as a sheet in a subsoil, it reinforces, stabilises, filters, separates and eliminates the creation of pot-holes. It is necessary to provide the required pore size so that sand does not pass through these fabrics from one side to the other. This size also governs the liquid transmission rate.

In the earlier geotextiles polypropylene was considered to be satisfactory since it is cheap, has low density, can be made UV-resistant, does not rot, and is inherently strong, except that it has the problem of creep. Once in place, a polypropylene membrane will slowly extend and finally fail. Akzo (Netherlands) who had contributed to the Scheldt Estuary reclamation and stabilisation project in which the textiles had to withstand salt water (sea water) the buffeting wave, and erosion threat, which called for strong and durable materials, had found that a polypropylene woven construction incorporating about 20% by weight of polyester was very suitable for the purpose.

Normally, a woven or knitted polypropylene is made with a width of at least 30 cm, preferably over 1m and a length of at least 3 m for stationary geotextile and/or constructional uses, such as for bearing one or more layers of sand, gravel, stones, clay, asphalt, mortar or other material to a height of at least 5-10 mm, the fabric having a tensile strength in one or two directions of atleast 50 KN/m. In the later constructions, with a strength of 75-600 KN/m, the elongation of rupture is between 5% and 20%, and the mass/unit area is 200-1000 gm/sq. m.

With 80/20 polypropylene/polyester construction, the creep is 10% of that of the earlier 100% polypropylene and the fabric may be loaded with upto 30-35% of the tensile strength or breaking load and the functional strength is raised by 3.5-5 times that of 100% polypropylene. In addition, the weaving efficiency is also improved. A typical construction is made from fibrillated polypropylene tapes of 25,000-50,000 dtex, the polyester component being untwisted tape yarns, 60-100 um thick and 1-150 mm wide. If used as warp, a twist of 10-40 or 50 turns/m can given. Nylon 6, nylon 66 multifilament or monofilament may also be used in the place of polyester.

For the construction of an embankment from this type of material, a stabilising effect can be obtained until the subsoil has sufficiently consolidation for it to have a higher load bearing capacity. Woven geotextiles enable steeper embankments to be constructed, which results in the use of less space so that what is saved may be used for other purposes.

In the construction of the embankment of River Niger in Nigeria, two widths of fabric were laid on top of each other and sewn together in their longitudinal direction, a distance of 30 cm being maintained between the seams so that tubes

were formed side-by-side. They were filled with soil from the original embankment. This type of mattress construction enables rapid vegetation growth to occur and is fully suitable for the purpose. Under flood conditions the new embankment protection will not suffer, provided that the mattresses have been laid properly and in an overlapping fashion so that any washing out from behind is prevented.

Geotextiles play an important role in keeping land from flooding. However, when fired-clay drains are used they are filled with very fine particles and ultimately it is necessary to remove them or lift and re-lay them completely. There are five or six envelope materials, based on nonwoven textiles with masses in the range 100-200 gm/sq. m. and 0.5-2 mm thick and made of polyester, polyvinyl chloride, polypropylene, nylon etc. either needle-punched, chemically bonded or spun bonded.

With filtration opening size (FOS) in the range of 80-120 um, they offer good protection from sand clogging. Certain constructions will not clog or even self-clog and may be used in fine textured soils. They have a small FOS, the geotextiles allow soil in the drain vicinity to remain fairly permeable. The major factor is that the opening size of the geotextile is always smaller than the particle size. The need for envelopes should depend on the clay content of the soil and the kind of envelope is still based on subjective criteria. Aspects to be taken into consideration in making a drainage envelope are:

1. Uniform distribution of fibres throughout the textile.
2. Combination of fibres of various lengths and diameters.
3. Decay resistance and partial decomposition capacity.
4. Good flexibility.
5. Tensile strength in both main directions.
6. High hydraulic conductivity perpendicular to the plane of the textile.
7. High porosity (about 90%).
8. Good filtration performance (should retain particles of more than 50 um in diameter).
9. Good weldability and
10. Reasonable price.

Soil is the most important material in civil engineering. Structures have to be built on or in the soil. Often earth itself is used to form structures like embankments. A civil engineer is constantly trying to find ways of stabilising, modifying and protecting the soil.

Separation

Geotextiles are used to prevent the contamination of one material by another. One very important use of geotextiles is in roadways, railways and parking areas, where the material used to form the base of construction (some form of aggregate) is supported from the soil below. Contamination of th structural base of roadways by the underlying soil is the mo common form of permeation failure.

A geotextile can prevent the pumping effect created b dynamic loads on, say, railways. The use of geotextiles allow the free passage of water while retaining soil particles thereb minimising frost damage to the aggregate base constructio

Reinforcement

Geotextiles can reduce the level of stress in the soil b spreading and evening the stresses when used to form a foundation. Building of road over soils such as marshes, swamps peat or other difficult areas, embankments and dams can b stabilised in the same way. Geotextiles can decrease the thickness of the road-making material needed and increase the lif expectancy of the road.

Filtration

Geotextiles used for this purpose can either be a wover or a nonwoven fabric, which permits the passage of wate while retaining the soil particles. Replacement of gradec aggregate filters can be done by a geotextile wrapping in vertical and horizontal drains.

In-line drainage

The ability of a thick or composite material to transmit water through the body of the material makes it valuable, where there is a need to conduct water away, as drainage layer laid under the roads or embankments. They may also be used to cover the walls of underground structures to cut off and carry away ground water and prevent it from entering the underground walls.

Nonwoven bonded fabrics

These are divided according to their role in construction, screening, and other physical properties relevant to construction:

1. As an independently functioning textile construction element in geotechnology (nonwovens for building construction),
2. As a backing material, reinforcement, support or similar material in roof, wall insulation and to insulate structural members in contact with the ground,
3. As a sheet for protection and screening (fire-, sound-, and heat-proofing) in the homes, industrial premises and public buildings.

Separating layer in road construction

The function of geotextiles is to separate the soil by differing particle size, so that when subjected to dynamic stress or as water passes through, the two soil types cannot mix. In road construction, the foundation layer is composed of

coarse grained material. Because of the open structure of the hollow areas, this layer prevents water from rising by capillary action from the subsoil. Nonwoven bonded fabric is laid as a base layer between the soil and the foundation so that this capillary breaking layer cannot become mixed with finer cohesive material.

In one case Typar (Du Pont) polypropylene spun bonded fabric was used in road construction:
Length of road built: 1.6 km
Width of road built: 9 m
Axle pressure/truck axle: 40 KN
Total surface area of road: 14,400 sq. m.

By using Typar fabric, the hard core layer was reduced from 35 cm to 28 cm, leading to lower cost of production. Further these roads show less sign of wear and have longer service life. This is especially true for roads on difficult soil and terrain.

Railway tracks

In laying the railway tracks, static as well as dynamic forces must be transferred from the rails via the sleepers to the gravel layer and into the earth below. The load-bearing capacity of this gravel layer may be greatly reduced if fine particles penetrate (frost damage) and moisture rises. To prevent this, the subsoil is covered with a sheet of nonwoven bonded fabric on top of which the track protective layer (hard core) is spread.

Road and railway track foundations with and without separating layers are shown in fig. 3. The effects of the separating layers in both cases can be seen in the uniform load-bearing capacity of the structure, which is not so in their absence. Thus geotextiles find many and varied uses and perhaps, these will find increasing uses in India too.

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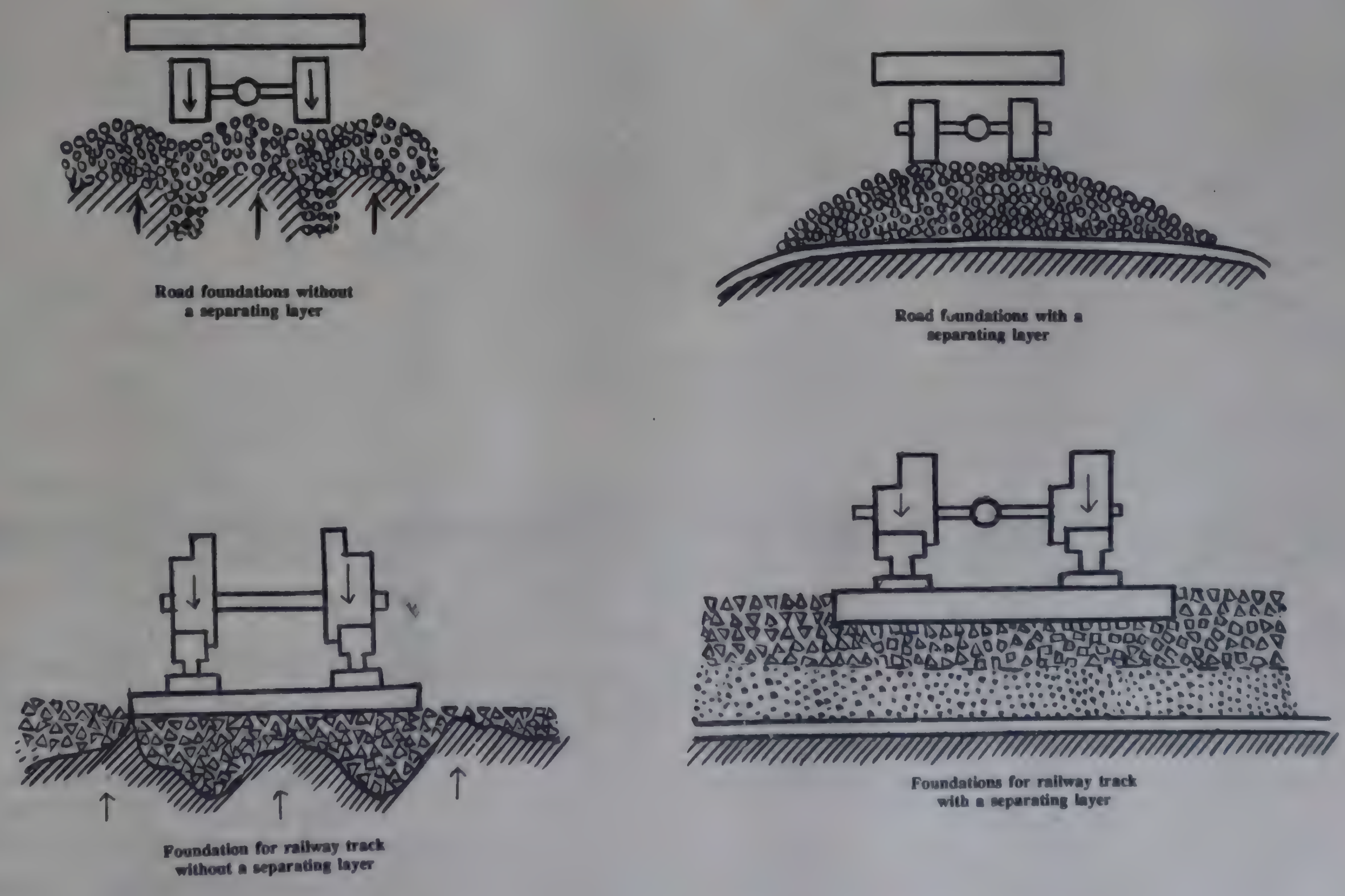


Fig. 3 Geotextiles in road and railway track foundation

Chemical News from Abroad

FRANCE CONFIRMS CHANGES BUT AROUSES CRITICISM

After months of rumour and speculation, the French industry ministry has finally published the official version of the restructuring of the state-owned chemical industry. The proposed moves have, however, come in for criticism from some industry observers.

The government communique confirms the splitting up of Orkem between the two national oil groups, Elf Aquitaine and Total CFP. Strong opposition from Mines de Potasse d'Alsace has spared EMC the same fate. However, within the next three months, Elf and EMC presidents are to examine "the most appropriate ways for a rapprochment of their chemical activities while respecting the personality of both groups".

As forecast, Elf is to get the lion's share of Orkem. The oil group, which is 55 per cent state-owned, is to be given the means, says the communique, "of joining the club of the 10 chemical world leaders and developing successfully". It will pick up Orkem's petrochemicals, plastics and specialities encompassed within Norsolor, as well as its fertilisers grouped within Grande Paroisse.

Added to Elf's existing chemicals base, Orkem's assets will double the group's ethylene capacity to 1.55m ton/year (11 per cent of European production). Its styrene capacity will also double, and Atochem's 500,000 ton/-year polystyrene capacity will account for 20 per cent of the European market and rank third.

In all, Elf's chemicals sector should now rank seventh in the world, and fifth in Europe, with consolidated sales of FF75bn and a workforce of 55,000. These figures also include the assets acquired through the swap with Enimont.

With Orkem's inks, adhesives and paints, Total CFP will acquire the chemicals base it has been trying to develop for some years to counter the slump in its oil activities. To Total Chemie's FF5.8bn consolidated sales will be added Orkem's FF4bn inks sales with Coates Brothers, Societe Georget and Societe Languedocienne Micron Couleur, giving Total third ranking worldwide in this sector. Total will have a leading position in adhesives and be eighth in Europe in paints. Its ranking in polyesters and acrylics will increase considerably.

Commenting on this restructuring which is meant to give France's chemical industry the "critical mass" thought to be needed for greater European and world competitiveness, a veteran French chemical observer, who did not wish to be named, was blunt: "They have smashed up the shop", he said, referring to Orkem.

"There is only political logic in the move and no industrial logic. Splitting Orkem in two has broken the acrylics product range which has been patiently built up over three years from the upstream to the downstream. The monomer upstream is now separated from its specialities downstream".

MTM BOOSTS POSITION WITH ACQUISITIONS

To boost its market position, MTM, the UK-based speciality and intermediate chemicals manufacturer, has announced a number of strategic acquisitions. These include UK agrochemicals manufacturer, Mostyn Chemicals. Acquired for £1m ($1.6m), this purchase is expected to further develop MTM's market position.

Mostyn offers a range of more than 100 crop protection products, with over 86% of turnover derived from overseas. In the year ended 31 March 1989, the group reported turnover of £5 m.

Overseas acquisitions includ[e] Austrian research chemicals compan[y] Loba Feinchemie for £1.95 m. Loba fi[ts] in with MTM's strategy of upgrading i[ts] quality of businesses, said a spokesma[n]. In addition, MTM has completed th[e] purchase of Italian fine chemicals man[u]ufacturer ASAP for £3.45m. A spokes[-]man said ASAP's assets are now full[y] integrated into MTM Prochem, th[e] wholly owned subsidiary.

CREDIT LINE LINKS IM TO RHONE-POULENC

Institut Merieux's FF5.2bn ($899m) acquisition of Canada's Connaug[ht] Bio-Sciences is to be financed initial[ly] by a credit line from Rhone-Poulen[c] which has a 50.6 per cent stake [in] Merieux. In a second stage, Merieu[x] will sell off the 100 per cent stake whic[h] Connaught has in Bio Research and th[e] 35.4 per cent holding it has in Nordi[c], retaining only Connaught Laboratorie[s], said president and general manag[er] Alain Merieux. This would mea[n] having to find just an additional FF3. bn.

Before the end of January, 1990 Insti[-]tut Merieux SA, the pharmaceutica[l] subsidiary of Institut Merieux Intern[a]tional, will have its capital increased b[y] Rhone-Poulenc and will become Pas[-]teur Merieux Serums & Vaccins. Subse[-]quently, a substantial part of the capit[al] of Institut Merieux SA, possibly [as] much as 49%, will be opened to inves[-]tors. Priority will be given to Canadia[n] investors in accordance with promise[s] given to the Canadian government.

EUROPEAN COMPANIES FIRM UP NEW SOVIET LINKS

European chemical companies no[w] recognise the potential of developin[g] solid links with the Soviet Union. Sev[-]eral are taking steps to strengthen the[ir] positions in a market which offers ov[er] 400 m consumers.

Continuing to consolidate its long established relationship with the Soviets, UK company Courtaulds is currently awaiting approval of a letter of intent covering the modernisation of two acrylic fibre plants. The projects which are together estimated to be worth around £160m ($264m) involve the upgrading of plant in Novopolotsk, West Soviet Union, and another in Navoi, SE Soviet Union. Courtaulds originally built the Novopolotsk plant; the other was constructed by the Soviets. Capacity will be increased substantially at both sites although specific details were not released.

Courtaulds, which has a long tract record of projects within the Soviet Union, says that "once we have this agreement under our belt, we will be able to consider further possibilities mainly in textiles and speciality chemicals". The group is optimistic that it will gain Soviet government approval later this year.

Meanwhile, the Italian state owned energy group ENI is to sign a $1bn contract with the Soviet government, to supply industrial plants and maintenance for chemicals, textiles and energy production to the Soviet Union during its 1991-1995 five year plan.

The announcement, which was made by ENI's new chairman Gabrielle Cagliari, said financing is to be arranged on the international market by a consortium of banks, to cover around 80 to 85 per cent of the contract's value. ENI is already involved in several other Soviet ventures including detergent production and oil and gas projects and it is believed that further ventures within these areas are being considered.

Meanwhile, ICI has finally signed its agreement to establish its first joint venture in eastern Europe. ICI Lacke Farben, an offshoot of ICI Paints, has entered agreements with the Soviet paints manufacturer LNPO Pigment to create an engineering and marketing base in Leningrad, through which ICI will promote its powdered paints business. Through the venture LNPO will have access to western markets and ICI hopes this breakthrough will pave the way for many more ventures said a company spokesman.

ICI, which has headquarters in Moscow, has traded with the Soviet Union since the company's foundation in 1926.

MONTEDISON MERGES WITH HIMONT

Montedison has confirmed the completion of its $51/share cash tender offer for all outstanding shares of Himont Inc. The offer, which was made by Montedison USA Inc. in November last, expired during the first week in January. Montedison received a total of 11,860,000 shares under the offer, boosting its stake in Himont to about 99.3 per cent.

The company also announced plans to introduce a merger transaction through which Himont would become an indirect wholly-owned subsidiary of Montedison. It is expected that the merger will be completed soon.

However, this move has aroused much speculation over whether Montedison will sell Himont to Enimont. One market observer said this move would make strategic sense and enable Enimont to build a more complete portfolio of plastics. Another possible contender is believed to be Statoil which is keen to develop its petrochemical business. Meanwhile, Himont has signed an agreement with Sandoz to produce Sandostab P-EPQ, the antioxidant used in the stabilisation of PE, PP and other plastic materials, within the US market.

EC APPROVES FREE TRADE TALKS

As expected, the EC council of ministers has approved the mandate for negotiating a bilateral free trade area between the EC and the Gulf Cooperation Council (GCC). This approval is in spite of opposition from Cefic and the European association of petrochemicals producers.

Such a free trade area would result in the gradual reduction and eventual elimination of tariffs on imports from the GCC into the EC. For refined petroleum product and petrochemical products, the tariff reduction timetable is to be carried out over a period of eight, 12 or 16 years, depending on the "sensitivity" of the product.

The directives given to the commission for negotiating the free trade area include some modifications, and, as a result, fall somewhat short of what the commission originally intended.

ICI EYES SEED GROWTH OPTIONS

ICI Seeds, which in 4 1/2 years since entering the seeds business has become the world's fifth largest company in the market, is still considering further acquisitions. However, no moves are likely to be made within the next 1-2 years, which will be mostly a period of consolidation, said ICI marketing services manager Keith Pike.

The company's trail of acquisitions began in 1985 with the purchase of a leading US maize company Garst Seeds Co. This was followed by Sinclair Mc Gill, Belgium's Societe Europeene de Semences, MMG Agriseed, Scottish Agricultural Industries and finally, in June 1989 the ContiSeed division of the US Continental Grain Co. In total, ICI Seeds currently has a turnover of some $250m/year, which it is hoping to double by the year 2000 or shortly after, said Ian Bartle, company external affairs manager.

However, there are still gaps in the company's territorial spread, added Pike. For example, it has no major

commercial presence in West Germany. Such an expansion would be achieved either by organic growth or acquisition, he said.

In addition, ICI Seeds is still considering entering the vegetable seeds market, which is second in size only to maize but is very fragmented. At present it has no breeding activities in vegetable seeds and only a small trading company. In the past, ICI has hesitated to enter this market because of its peculiar structures, but it is now carrying out commercial and market research to evaluate its potential and will be making a decision in the next couple of years, added Pike.

Pike denies the company is interested in acquiring the French and UK businesses of Nickerson International Seeds Co., which Royal Dutch/Shell announced it may sell in December.

GENENTECH TAKES OVER CANADIAN JV

Genentech Inc. has acquired Boehringer Ingelheim's 50 per cent stake in Genentech Canada, a joint venture partnership formed by the two companies. Under the new agreement, which became effective 29 December 1989, Genentech Canada was dissolved and the assets of the partnership were purchased by Genentech Canada Inc.

The partnership was initially formed to market and distribute pharmaceuticals produced by Genentech Inc. and had estimated sales in 1989 of $9m. Boehringer Ingelheim's role in the venture was to supply, through its Canadian pharmaceutical subsidiary, the knowledge needed to launch the products into the Canadian marketplace.

CHEMICALS GROWTH WILL SLOW IN WESTERN EUROPE

The European chemical industry is facing a period of slower growth at the start of the 1990s, warns Richard Freeman, chief economist at ICI and chairman of the UK Chemical Industries Association's economic appraisal committee. Speaking at the CIA's annual business outlook conference in London, he said that with the exception of Germany and Italy, chemical production will rise at a slower rate in 1990 than in 1989.

Figures from Cefic, the European chemical industries federation, give a predicted increase of 2.6 per cent in Western European chemical production for 1990, down from the 1989 figure of 3.6 per cent. This slowdown is a continuation of the sharp fall in year-on-year growth rates seen in all major chemical producing countries from the middle of last year. This is not surprising for the UK and the US, says Freeman, but for Japan and West Germany it would not at first sight seem likely, as the general economies in these countries have been showing good growth.

Factors influencing the figures are most likely to be a generalised stock adjustment following a period of involuntary stock building through the latter part of 1988 and the early part of 1989.

The weaker outlook for chemicals in Europe reflects forecasts of a considerable slowdown in West European industrial growth as a whole, from 4.5 per cent in 1989 to 3.25 per cent this year. Freeman suggests from these and other figures that there is still some limited destocking to take place, although he admits that some chemical federations in Europe take the view that destocking has largely come to an end, and that growth rates are likely to accelerate a little through 1990.

Looking specifically at the UK, Freeman predicts only a one per cent increase in chemical production, with best performances coming from the pharmaceuticals and cosmetics sectors, these showing around a four per cent growth. Polymers and organics are expected to stagnate, while fertilisers and fibres growth could be negativ with fertiliser production falling by fo per cent over the coming year.

The saving grace for the UK chem icals industry will be a rise in expor of some 3.5 per cent, predicts Freema as UK domestic demand virtually stag nates. Exports last year remained stead while domestic demand rose by a head 8.5 per cent. In this respect the UK wi buck the trend set by the rest of Europ Cefic is expecting European chemica export growth to slow to four per ce from the 1989 figure of 6 per cent.

The fall in the value of the pound wi help UK exports, while the strength o the Japanese and West German econo mies will act as a stimulus to impor into these countries.

ISRAEL ALTERS POLICY ON IC

A change in Israeli governme policy regarding the sale of Isra Chemicals (ICL) has been revealed b trade and industry minister Mr. Ari Sharon. The government is now pre pared to sell just 25 per cent of ICL t the public through an offering on the T Aviv stock exchange within the ne three months.

Agreement on the issue was reache recently between finance minister M Shimon Peres and Sharon. It follows resolution, passed by the Kness finance committee in Decembe admonishing the government not to giv up control of the company, which po sesses the most important natur resources in the country. The gover ment is to continue, however, to see foreign investors who could control up 26% of ICL. The 25% share offering to involve shares either in the holdin company ICL itself or in its largest an most profitable subsidiary, Dead Se Works. Meanwhile, Sharon and Pe have decided to dismiss ICL chairma Rafael Eytan, a decision which has be formalised at an ICL board meeting. replacement has not been announce

Chemical Markets Abroad

VOLATILE MTBE MARKET TRACKS GASOLINE SHIFTS

European contracts for MTBE have been fully settled for quarter one. Negotiations were mainly concluded before the spot price upheaval, experienced in the first weeks of the year, and so do not really reflect the higher spot numbers seen. Prices for the main body of quarter one business were settled in the range of 1.47-1.49 premium gasoline, with some smaller customers paying up to 1.50 premium gasoline.

At the end of quarter four spot MTBE prices stood at \$300/ton. In the second week of January, numbers peaked at \$345-347/ton, before falling back to \$330-335/ton. MTBE numbers have closely tracked gasoline in 1990, which has been strongly influenced by the US situation. In the first week of January an unexpected cold snap hit the Gulf region of the US. Upto 20 refineries were forced to either close or reduce production. Market fears on availability grew and within a week premium gasoline touched \$230/ton.

With US gasoline inventories perceived to be low, European players considered the option of shifting quantities of gasoline to the US. This activity boosted the fortunes of octane enhancers, such as MTBE. US refineries demand a higher octane rated gasoline than normally produced in Europe. Blenders and refineries in Europe increased their demand for incremental octane enhancers, including MTBE, pushing prices up to \$347/ton.

The majority of refineries have either begun start-up procedures or are already back on stream. In the third week premium gasoline numbers drifted down to \$205-214/ton, with even lower numbers quoted. MTBE slipped down to \$330/ton. In the light of these developments European MTBE buying interest levelled off, as of the opportunity to shift gasoline to the US receded. By third week of January the publishing of American Petroleum Institute (API) figures boosted gasoline price ideas. The data showed that gasoline inventories were approximately 6.5m barrels down on the previous week; and 18m barrels down on comparative 1988 numbers.

Gasoline price ideas turned around, prices rising from \$216 to \$220/ton. MTBE also showed signs of recovering.

US POLYMERS SHOW SLOWDOWN

The US Society of the Plastic Industry (SPI) reports sales of polypropylene up by 1.8 per cent in the US in 1989. This marks a large decline on the 7.1 per cent growth experienced in 1988 over 1987. The fall in exports, due to China's withdrawal from the market, is cited as a major factor.

US domestic sales of polypropylene jumped by 3 per cent last year, with injection moulding leading the field with 6 per cent growth. Consumption of polypropylene resins in the fibres and filament market added to the increase.

Sales of ldPE dipped by 4.4 per cent in 1989, to 4.4m. ton/year. The slackening in use of ldPE film applications has fuelled the slump. High density polyethylene sales enjoyed slight growth of 0.2 per cent to 3.6m. ton/year. A drop in domestic demand for both injection moulding and blow moulding products contributed to the slowdown.

Polystyrene sales rose by 3.5 per cent, pushed by a massive 27 per cent upturn in export sales. Domestic sales had a more moderate rise despite environmental concerns around polystyrene packaging.

It is in exports that US polymers fared best, despite China's partial withdrawal from the market. PVC experienced a strong growth in export levels, which were some 59 per cent above 1988 figures.

CHINA BOOSTS ETHYLENE CAPACITY

China has recently completed a 300,000 ton/year cracker in the Shanghai region. China Petrochemical Corp. (Sinopec) owns the new facility, which is China's fifth and largest cracker. The new unit will bring China's domestic ethylene capability up towards 2m ton/-year, once the new unit reaches full capacity.

The complex was built at a cost of 6bn. Yuans (\$1.6bn) and will eventually produce polypropylene, PVC and caustic soda, lowering China's dependence on imports.

Sinopec is currently planning China's petrochemical development into the next century. A £1.3m loan by the World Bank is helping this process, as are US consultancies International Development Planners and Arthur D Little.

China raised its ethylene output to 1.2m in 1989, says Pace Consultants of Houston, a 38 per cent hike on the previous year.

FRENCH CHEMICALS GROW IN 1989

The French chemical sector saw growth dip from 6.8 per cent in 1988 to 5 per cent in 1989. A growth rate of 3 per cent is expected for 1990. The figures were released by Uniondes Industries Chimiques (UIC), the trade organization of the French chemical industry, data for the trade balance were also made available to mid-1989. Exports grew 18 per cent to FF76.8bn, (\$13.5bn) with imports up 17 per cent to FF65.3bn. The balance stood at FF11.4bn, an increase of FF2bn over the first half of 1988. Expectations for the second half are less optimistic, however. In 1989 UIC says investment grew by

around 18 per cent on the previous year, up from the 12 per cent reported for 1988 over 1987. Employment in the industry is at present stable; a 3 per cent growth rate is expected for 1990 by UIC.

EC CLAMPDOWN

The EC commission has begun a review of previous undertakings by overseas suppliers on dumping charges. Oxalic acid imports from Brazil have become the object of renewed investigation. A definitive antidumping duty was imposed in December 1984 after the commission received the undertaking of the Brazilian producer in question. Community producers have now lodged a complaint with the commission alleging that dumping margins exceeding 70 per cent have occurred. It is claimed that between 1985 and 1988 imports from Brazil continued to be forthcoming at prices below community levels, and that their share of the community market increased by 7.1 per cent between 1984 and 1988. Concern has also been raised by the proposed acquisition of one of the Brazilian producers in question by an American group. Current antidumping measures are being kept in force during the investigation.

STOLT TANKERS LAUNCHES PUBLIC SHIPPING COMPANY

Stolt Tankers and Terminals plans to launch a public shipping company. The new venture, to be called Stolt Partners SA, will raise $63m on the relatively new Oslo Stock Exchange. Stolt Partners will initially be sold six parcel carriers from Stolt Tankers, in a deal believed to be worth $100m. The ships are four 36,000dwt vessels, the Stolt Falcon, Eagle, Condor and Hawk, plus the two 23,000dwt vessels Stolt Surf and Span. The carriers were built between 1970 and 1980 and are capable of carrying both chemicals and vegetable oils. The new company's marketing, operations and ship management will be contracted out to Stolt Tankers. Stolt Partners' fleet will continue to trade within the Stolt Tankers Joint Service, under the account of Stolt Partners. Stolt Tankers plan to take an initial 33 per cent equity stake in the new company, through the wholly owned subsidiary Parcel Tankers Inc. The balance of shares will be underwritten by a consortium managed by Fernley Finans and Svenska International plc. Shares of the new company will be placed mainly in Norway and Sweden. Interestingly the offer will not be open to US investors as the shares will not be registered with the United States Securities and Exchange Commission.

The venture is described as a "win-win situtation" by Christopher J Wright, president and chief operating officer of Stolt Tankers and Terminals. "Stolt will receive new capital to deploy within the group and a new partner in Stolt Tankers Joint Service", he continued. Stolt has chosen the Oslo Stock Exchange for the launch of the new company to gain access to the Scandanavian capital market. The area, especially Norway, is seen as the leading market for shipping investment. The venture is seen by Stolt as an investment vehicle designed to share in a long term growth business. The time is now ripe for investors to think of profit, cash flow and quality of operations, which according to Stolt this new venture will allow. Although the total equity to be raised by the flotation will be $63m, including Stolt Tankers one third share, total capitalization of Stolt Partners will reach $112-137m, including bank debt.

US CHEMICAL SALES SURGE

US Chemical export sales in 1989 jumped some 22.4% on 1988 figures to reach $37 bn, according to the Chemical Manufacturers' Association (CMA). Strong domestic and export demand has supported chemical industry sales and profits are predicted to either equal or overhaul 1988's $23.7bn, which was itself a record. Chemical shipments in the US are expected to grow by 6% t reach $255bn, representing a third con secutive record year. Imports are up t $21bn with a trade surplus of £16b being predicted. This would be a $3.6b gain on 1988. Income from direc investments abroad by chemical com panies, plus royalties, licensing fee rentals and other service charges shoul account for a $4bn surplus, matchin 1988's figures. Overall, the chemica industries contribution to the US econ omy is put at a surplus of £20bn i 1989. The director of trade and econom ics at the CMA anticipates another ex cellent year for the US chemical indus try in '90, despite the recent softenin of the economy. Among CMA membe companies a 5-7% rise in chemical sale is being predicted for '90. Operatin rates throughout '89 are said to hav averaged 87.8%, the highest of th decade and it looks likely they will sli to 86% this year. In '89 US capita expenditure on new chemical plants an equipment jumped to $21.3 bn, 10.6% above the previous year's figure.

JAPANESE INCREASE ACID EXPORTS

Japanese exports of sulphuric acid ar on the increase. In 1987 exports stoo at 500,000 tons, but this rose to 590,000 tons in 1988. Figures for 1989 indicate that sulphuric acid exports could reach 754,000 ton. Strong demand from fer tilizer manufacturers in Taiwan, South Korea and the Philippines is supporting exports. However, Japan's domesti demand for sulphuric acid is going int decline. The predicted fertilizer use o sulphuric acid for 1989 is not expectec to overtake the previous years figures In the first half of 1989 a number o Japanese sulphuric acid plants were closed for government inspection, lead ing to tightening of supply. Producers have indicated they will adopt a domestic-demand-first policy and s tighten exports. Japanese use of sul phuric acid in products such as alumin ium sulphate and titanium dioxide i healthy.

Plastic Markets Abroad

POLYMERS MARKET SEES LACKLUSTRE START TO YEAR

The long break over the Christmas/-New Year period gave polymer markets a respite, which has been followed by a slow start to the year. Price hikes looked for in most polymers before the break have not yet had time to make their impact felt. Some producers are looking to even outprice levels on a European basis, while some are looking for higher prices to reflect the recovery in the market since the low points reached in quarters 3 and 4.

Markets are generally steady and only PVC continues to buck the trend to stable or firmer prices in Europe. Effects of imports appear to be having less influence on the market than in past months, except for PVC.

Because real business in the new year is only just beginning to emerge, it is difficult to access where the polypropylene market stands. Most producers are adamant that a 5-10pfg/kg price hike will hold in January, although whether this is true is still unclear. However, thereare clear signals that some price hikes will take place over the first two months.

Producers are no longer under pressure to reduce stocks, as their inventories are balanced. Traders and converters are finding it increasingly difficult to source cheaper merchant product, strengthening suppliers hands. PCD and Beaulieu do not appear to have fully commissioned their units, further tightening supplies.

Presently prices are unchanged, although this could change rapidly once January business emerges. Raffia grade material is generally quoted at DM1.40-1.45/kg, with some lower numbers still being heard. Injection moulding ranges from DM1.55-1.70/kg, although some cheaper material is available. Copolymer remains the only trade still facing some downward price pressure, although numbers remain at DM1.70-2.00/kg, the higher range end being for specialized grades. The influence of Phillips 66 Pasedena outage is still reverberating around the hdPE market. Phillips' licensed plants are believed to be supplying the US, leading to a lessening of availability outside the US. Traditional exporters in South America and Eastern Europe are currently importing, again tightening supplies.

Although hdPE prices remain unchanged they are believed to be facing upward price pressure. Injection moulding is in the range of DM1.60-2.00/kg, with film grade ranging from DM1.75-2.10/kg. Blow moulding product is believed to be specially tight with prices at DM1.80-2.05/kg.

LdPE has seen little change in prevailing European prices. Producers are understood to be aiming for a 5 pfenning hike but it is not yet clear whether this will succeed. Converter demand has yet to stand out beyond a seasonal upturn typical of January. For deliveries, one source reported some increased demand from the US, though increased volumes were not substantially affecting prices. At present, therefore, numbers remain at DM1.60-1.65/kg on an average.

LldPE trails at a 10 pfenning discount below its co-blender, ldPE, as the latter fails to tighten. Benelux still sees lower prices than the European average, and in the UK the last price increases have not been sufficient to make up for the weak UK pound. The West German market, typically showing relatively low numbers, is now closer to the European average, at DM1.50-1.55/kg.

PVC continues to pose problems to European producers. Although demand is still strong, prices have been drifting down at a rate of some 2-3pfg/kg a month since last September. This is due to increased level of import materials, especially from the US. Prices have now dipped below DM1.70/kg for suspension grade material, down to a level of DM1.65-1.75.

Imports are now standing at around 10 per cent of consumption and there is little sign that the flow will stop in the near term. Only if there is an upturn in the US if Far East buyers enter the market will the situation in Europe be alleviated. But with European prices still high in comparison this does not seem likely. Major producers are still mulling bringing a dumping case against US producers.

Polystyrene started 1990 in strong mood with forward order books showing a healthy level of business, following on from a surprisingly buoyant Q4 in 1989. Prices hikes in the region of 10pfg/kg are being scheduled by most producers for February. Although implementation of price rises asked for last year is proving slower than desired in cases, optimism is high that they will eventually go through. Prices are still standing at around DM2.20/kg. for GP and DM2.30/kg for HIPS. Huntsman brought fully on-stream its new 50,000 ton/year polystyrene plant at Carrington in the UK. The extra capacity, all high-impact extrusion material, takes Hunstsman's capacity in the UK to 75,000 ton/year.

It has no other production sites in Europe. Half the additional PS is contracted to General Electric Plastics for use in its Noryl modified PPO, a blend of PPO and PS. The remaining 25,000 ton/year is targeted at the UK and export markets. With demand for PD running strong in Europe, Hunstman is looking to increase capacity at the site by a further 50,000 ton/year, possibly within the next 14-18 months. This will be general purpose crystal grade material.

PS demand in the UK is thought to have grown by some 5-6 per cent during

1989, reaching a level of around 190,000 ton. In October last year, Atochem also increased its PS capacity in the UK with the start-up of a 53,000 ton/year plant at Stalybridge. Allowing for the closure of a smaller plant this puts Atochem's UK capacity at 80,000 ton/year, covering both crystal and high impact grades of material.

Plastics price report (DM/Kg)

Product	Market Price December	Market Price January
High density polyethylene (hdPE)		
Injection moulding	1.60-2.00	1.60-2.00
Film (extrusion) grade	1.75-2.10	1.75-2.10
Blow moulding	1.80-2.05	1.80-2.05
Linear low density polyethylene (lldPE)		
Film grade (butane-based)	1.45-1.50	1.50-1.55
Low density polyethylene (ldPE)		
Film grade	1.60-1.65	1.60-1.65
Polypropylene (PP)		
Raffia grade	1.40-1.45	1.40-1.45
Injection moulding	1.55-1.70	1.55-1.70
Copolymer	1.70-2.00	1.70-2.00
Polystyrene (PS)		
General purpose	2.20-2.30	2.20-2.30
High impact	2.30-2.40	2.30-2.40
Polyvinyl chloride (PVC)		
Suspension	1.70-1.75	1.65-1.70

The left hand column gives a guide to price levels for large-to-medium size buyers and for general purpose grades in December. The right hand column shows the latest prices in January.

Environment

UK FIRM PLANS TOTAL CFC RECOVERY NETWORK

British Engineers are claiming a world first with the announcement of a process to recycle all the ozone-depleting chloro-fluorocarbons (CFCs) contained within discarded refrigerators. The first commercial-scale plant could be on stream by the end of next year.

Current technology allows reclamation of CFC coolants, but these account for only around 20 per cent of the CFC content of refrigerators. The new process, under development at the Bird Group of Stratford-on-Avon, should make possible the recycling of the remaining 80 per cent of CFCs contained within the insulation foam.

John Whittaker, group environmental controller at Bird, said development of the process was at a stage where various existing technologies are to be combined into one fully automated process and where several difficult technological hurdles have to be overcome.

First step involves sucking the CFC coolant into tanks. Then the fridges pass through an airlock into a reduced pressure environment. The metal is separated from the insulation material, then passed through an exit airlock and separated into various grades before being sent to foundaries. The CFCs are "squeezed" out of the insulation material under reduced pressure, the gas is cleaned and liquefied for transportation to ICI, which has agreed to deal with the reclaimed CFCs.

In collaboration with Lindemann Maschinenfabrik, a West German recycling machinery specialist, Bird engineers will develop a commercial-scale plant design. "It is the first time airlocks and negative pressure environments have been used in the scrap processing industry", Whittaker explained, "and the recovery of CFCs from air mixes has not been attempted at such high volumes before."

The first plant will be located at one of the Bird Group's 25 UK sites. Talks are underway with the UK department of trade and industry about financing. If all goes well, Bird plans to have a network of plants in place across the UK by the mid-1990s, capable of processing up to 90 per cent of all scrap refrigerators and freezers. Expansion into Europe could follow.

As well as the technical aspects, the Bird Group is also addressing various options for establishing a network for collecting discarded units, such as through trade-in agreements with refrigerator suppliers and collection by local authorities.

Whittaker estimates 3.3m refrigerator units/year are discarded in the UK. The average contains 150g of CFC refrigerant mixed with 350g. of lubricating oil, and a further 500g. of CFC blowing agent, dispersed within 4 kg. of insulating foam.

While the primary aim is to recycle CFCs from refrigerators, the process is applicable to any CFC-containing material, including building insulation. Researchers at the South Bank Polytechnique in London are testing propane as a coolant for domestic refrigerators. Ron James, research director in the Institute of Environment Engineering, believes that despite its flammable nature propane can be harnessed safely, providing a less expensive and environmentally friendly alternative to CFCs.

Propane has previously found use as a coolant in industrial refrigeration plant, but never in the home. James says the liquefied gas is currently 'holding its own' energy-wise in a refrigerator designed for CFC coolants. Work is continuing on optimizing the system and designing an intrinsically safe appliance. James envisages propane as a direct competitor to the new family of CFC substitutes, such as HFA 134a, planned for commercialization within the next few years. With UK-based firms still to be convinced, the polytechnic has agreed to collaborate with Arcelik, a Turkish refrigerator manufacturer, on developing a commercial unit.

CEFIC CALLS FOR NEW "WASTE" DEFINITION

Cefic, the European federation of chemical industry associations, is calling for a change in EC waste disposal legislation whereby recyclable residues would be treated differently from "true" waste. In a discussion paper to be submitted to the European Commission, Cefic argues that classifying recyclable materials a waste is not compatible with the aim of encouraging re-use of residues. "Industry needs incentives to research and develop recycling processes and avoid overloading waste disposal capacity", Guy Thiran of Cefic's technical affairs department said. "This is not achieved by applying the same stringent control procedures to all residues, as proposed in the new EC directives". Cefic says there is a need to find appropriate levels of control for both kinds of material. The federation's proposals for a simpler approach to what it terms "secondary raw materials" are based on the existence of a contract between the generator, the licensed recycler and the appropriate authority. National federations have until today to comment on the paper before it is submitted to the Commission.

The concept of "secondary raw materials" is not unique to the chemical industry. The European Court of Justice has been asked by an Italian court to rule on what constitutes industrial waste. The Pretura de Asti has turned to the Luxembourg court in the case of two shippers being sued for shipping waste without the required authorization. G Vessoso and G Zanetti

argue that what they shipped was not waste but reclaimed materials that would be recycled by other plants.

The Luxembourg court is now being called on to interpret the 1975 and 1978 directives concerning toxic and hazardous waste.

A date for the hearing has still to be fixed, with a judgement not expected for at least a year.

US SCIENTISTS REPORT ONE STEP SO_2/NO_x CLEAN-UP

Two Californian scientists have reported promising results for a novel chemical method which they say will allow the simultaneous removal of the sulphur and nitrogen oxide pollutants from power plants and incinerators. The process could prove more economic than the two-stage selective catalytic reduction (SCR)/wet limestone scrubbing.

Shih-Ger Chang and David Liu of the Lawrence Berkley Laboratory describe how an aqueous emulsion containing yellow phosphorus (P_4), limestone and an alkali can remove both kinds of oxide, forming saleable nitrates, sulphates and phosphates as byproducts.

"If we can sell the byproducts (as fertilizers) at 50 per cent of their market price, our process will be competitive with SCR/wet limestone scrubbing", Chang said.

Conventional wet limestone processes are efficient in sulphur dioxide control but are incapable of removing flue gas nitric oxide (NO) because of its low solubility in water. In the new process, the yellow phosphorus is believed to react with oxygen in the air to form intermediary ozone which reacts with the NO pollutant yielding nitrogen dioxide, NO_2. This then either reacts with further NO to give dinitrogen trioxide N_2O_3 or dimerizes to dinitrogen tetroxide, N_2O_4.

"The products NO_2, N_2O_3 and N_2O_4 are all much more soluble in water than the original NO", says Liu, "and can be removed at levels up to 100 per cent". Chang and Liu are collaborating with the US engineering contractor Bechtel, working on a bench-scale unit scrubbing 600 litre/day of flue gas. Negotiations are in hand to test the process on a pilot plant scale. One option is to use the existing 0.4 and 4 MW facilities at the Electric Power Research Institute's high sulphur centre in Buffalo, New York state. Alternatively, a pilot plant will be built close to an existing power plant.

Pure Air, a flue gas desulphurization joint venture between Air Products and Mitsubishi Heavy Industries America, is understood to be vying with Bechtel to scale up and commercialize the process.

Biotechnology

BAYER/CAL BIO DEAL ON ATRIAL PEPTIDES

California Biotechnology has signed an agreement with Bayer giving the West German multinational worldwide rights to develop and commercialize products based on Cal Bio's atrial peptide modulation technology. Atrial peptide modulators are expected to play an important role in treatment of cardiovascular disease, and the technology had developed from Cal Bio's pharmacological work in this area.

Separately, Cal Bio has said US pharmaceutical firm Eli Lilly has terminated its licence for the use of Nazdel technology for intranasal delivery of insulin. Lilly expressed concern over the effective dosing for non-insulin dependent diabetics, which the company had targeted. Cal Bio will receive all clinical data relating to Nazdel, and the company is looking for another licensor for the technology.

FOWL DRUG OFFERS CANCER HOPE

A drug developed by US pharmaceutical giant, Merck & Co, for a parasitic disease in chickens, is showing unusual and promising anticancer effects, say researchers at the National Cancer Institute (NCI) in Washington, DC. The drug, currently identified by code number L651582, shows signs that it could block the spread of cancer cells, suggesting a new way to treat cancer chemically. Most current therapies treat the patient by attacking the cancer cells but do not address the problem of proliferation, or metastasis.

The drug was supplied to the NCI following an observation by a Merck scientist that it interrupted a particular series of chemical reaction known to be involved in metastasis. In a results of initial tests, the drugs was shown to extend the lifetime of mice infected with cells from human ovarian cancer. This, the NCI researchers claim, "suggests strong evidence for potential human benefit." The researchers need to develop a soluble form of drug, to enable intravenous administration, before further trials can take place. The NCI has lodged an application for phase I toxicity testing with the FDA and an NCI spokesman said the team hopes to start trials in 6-8 months.

Safety studies at the Merck Institute for Therapeutic Research suggest the drug has not exhibited any major systemic toxicity in animals, report the NCI scientists, who add that the action of the compound indicates that it may be useful used alone or combined with existing therapies. Merck is, however, playing down claims, saying that many compounds' actions do not transfer from animals to humans and that research is at a preliminary stage.

BIOGEN AIMS FOR PROTEIN INHIBITOR

Scientists at Biogen have reported the identification, cloning and expression of a novel human receptor protein in the journal *Cell*, which the company believes may offer a new approach to the treatment of autoimmune and inflammatory diseases. The receptor protein, vascular cell adhesion molecule 1 (VCAM-1) is a central mediator of lymphocyte (white blood cell) recruitment into inflamed tissue. Biogen believes that if a VCAM-1 inhibitor can be found, a method of controlling the immune response will be achieved which can be utilized against autoimmune diseases, such as arthritis.

VCAM-1 expression is induced in response to cytokines, such as interleukin-1 and tumour necrosis factor, themselves released in response to infection and tissue injury. VCAM-1 is expressed on the surface of the cell layer lining the blood vessels, at the inflammation site. Lymphocytes moving through the blood vessel are found to adhere to the VCAM-1 rich endothelial cell layer. Following this adhesion, the lymphocytes migrate into the underlying tissue, triggering a chain of pro-inflammatory events which cause tissue damage.

News from Japan

STANDARDS EYED FOR INFRARED RADIATION-EMITTING CERAMICS

Ministry of International Trade and Industry (MITI) is scheduled to hold early next year hearings soliciting the views of makers of raw materials for far infrared radiation-emitting ceramics with regard to establishment of guidelines for the methods of assessing the ceramics and indicating their effects and integration of related industrial groups.

MITI thereby intends to grasp the actual conditions of their business operations and basic trends of the business involving far infrared radiation-emitting ceramics.

MITI set up last July Far Infrared Radiation-emitting Industry Committee within Japan Fine Ceramics Association in a bid to solve technical problems related to the industry: the committee is comprised of scholars and men with experience in the food/medical/ceramics fields, researchers at national research institutes and technical experts from private companies.

The committee is due to compile a report by next March and MITI will establish the said guidelines by the same month.

Far infrared radiation-emitting ceramics have been used for heating purposes (baking of paints, drying and heating, etc.) for a long time. They have recently been applied to non heating fields covering maintenance of the freshness of foods, underwear, sheets and improvement of the taste of foods. Their effects in the nonheating fields have yet to be completely elucidated and MITI formed the abovementioned committee with the aim of scientifically examining these effects.

MARUBENI TAKES OVER MEXICAN AGROCHEMICAL PRODUCER

Marubeni Corp. has taken over Cuproquim S.A. — a Mexican maker of inorganic agrochemicals — via its U.S. subsidiary, Cuproquim Corp. The U.S. company, located in Houston, Texas, is scheduled to market the Mexican firm's products.

Cuproquim S.A. has two manufacturing plants, one each in Mexico and Chihuahua States, with their combined production capacity reaching about 10,000 tons a year. The company's major items are copper-based fungicides including cupric hydroxide and basic copper chloride and its annual sales stand at $15 million.

Roughly 80% of all the company's products combined are shipped to the United States and Europe. Cuproquim Corp. plans to step up exports of Cuproquim products and expand their annual sales to $25 million three years hence.

Marubeni has bought the Mexican firm since the latter exports most of its products. The leading Japanese trading company intends to make investments aimed at implementing pollution control measures for the abovementioned two plants and improving the product quality of agrochemicals produced by the Mexican firm.

Inorganic copper-based fungicides have come to be highly rated for their safety, while there are moves worldwide toward putting use of organic fungicides including EBDC under legal control with due consideration given to their toxicity. Marubeni is intent on investing in agrochemical operations overseas: it took over Helena Chemical Co. — the U.S.' second largest agrochemical distributor — in 1987 and bought 25 per cent of the shares of a Malaysian agrochemical maker in 1989

SULPHURIC ACID DEMAND IN SOUTHEAST ASIA BRISK

Exports of sulphuric acid are increasing. Although domestic demand is leveling off from previous years due to sluggish fertiliser demand, exports are expanding supported by brisk fertiliser demand in Southeast Asian countries.

However, in the first half of 1989 many sulphuric acid manufacturers' plants will be closed for periodical inspection. Consequently, the supply-and-demand situation for sulphuric acid is expected to become tight.

Manufacturers say that they will adopt a domestic-demand-first policy and tighten exports. Therefore, it is expected that there will be insufficient sulphuric acid for meeting the brisk demand in overseas countries.

Sulphuric acid production in the first half of fiscal 1989 registered a hefty 3,588,000 tons owing to an increase in production stemming from active demand for copper and zinc.

Regarding domestic demand, however, industrial use of sulphuric acid for such products as aluminium sulphate and titanium dioxide is brisk, but fertiliser use is decreasing due to sluggish domestic demand and an increase in imports. Domestic demand in the first half of fiscal 1989 recorded 2,973,000 tons, leveling off from the preceding year.

On the other hand, exports are expanding. Sulphuric acid exports in 1986 and 1987 were about 500,000 tons. In 1988 they increased to 594,000 tons. Demand for fertilisers in Southeast Asian countries such as Korea, Taiwan and the Philippines is brisk and fertiliser manufacturers there are crying out for more supplies of suphuric acid.

Under the circumstances, the Japanese parties concerned predict that suphuric acid exports in 1989 will register 754,000 tons, a marked rise of 27% over the previous year.

CEILING OF PRODUCTION CAPACITY FOR ETHYLENE SET AT 6.5 MIL. T.

The Ministry of International Trade and Industry (MITI) recently released its forecast that Japan's combined production capacity for ethylene will reach at most 6.5 million tonnes a year after existing production facilities are debottlenecked; it will amount to 6.27 million tonnes a year by the end of next year and technically there will be leeway for expanding the capacity by an additional 200,000 tonnes a year.

The forecast was given at a meeting of Production-Capacity Subcommittee attached to Petrochemical Supply-Demand Conference — an adivsory panel to the director of MITI's Basic Industries Bureau. The forecast will exert a delicate influence on planned construction of six ethylene centers in Japan.

The estimated production capacity is slightly higher than a similar estimate formed in June, 1988 by the Industrial Structure Council.

According to MITI, there are production-expansion plans in Japan for LDPE (190,000 t/y), HDPE (40,000 t/y) and polypropylene (390,000 t/y). Production capacities for the three items will, therefore, reach 1.9, 1.1 and 2.09 million tonnes a year respectively.

At the meeting, MITI officials gave explanations to attendants with regard to production capacity for ethylene and other petrochemical products and representatives from the six planners of the abovementioned ethylene centers reported on the degree of implementation plans.

New Developments from Japan

CAPACITY BUILD-UP PLANNED FOR SUBSTITUTE FOR CFC-11

Asahi Glass Co. is scheduled to scale up in the middle of this year its supply capacity for HCFC-123 — a substitute for chlorofluorocarbon (CFC-11) — to 800 t/y by modifying the 500 t/y plant built in the middle of last year at the company's Kashima factory.

CFC-11 is used as a blowing agent for synthetic resins but production and consumption of the product have now been put under legal control all over the world.

HCFC-123, 141b and 142b have been developed as substitutes for the product. Regarding HCFC-123 as a promising substitute, the company is supplying the product to users in sample form. It has decided to build up the production capacity concerned in response to growing demand for the product itself.

It plans to build an exclusive-use commercial plant for the product depending on the results of chronic-toxicity tests for CFCs, which are being conducted in accordance with Program for Alternative Fluorocarbon Toxicity Testing (PAFT).

In a related development, the company recently began to supply HCFC-225ca and 225cb — substitutes for CFC-113 — in sample form. In addition, it has established a 50-60 t/y supply system for HFC-134a, a substitute for CFC-12. It is thus ready to supply substitutes for CFCs for blowing/cooling/washing purposes.

BUSINESS TIE-UP FOR SEPARATOR MEMBRANES AGREED ON

Daicel Chemical Industries, Ltd., Hoechst Celanese Corp. and Hoechst AG (W. Germany) have signed cross-marketing contracts with regard to their separator-membrane operations. They intend to further expand markets for existing products and exploit those for new ones by exchanging technology and information on markets with each other.

Under the agreement, Daicel Chemical will take over microporous polypropylene (PP) film operations from Polyplastics Co. — jointly owned by Daicel Chemical and Hoechst Celanese — and exclusively market in Japan "Nadir" separator membranes produced by the W. German company.

In addition, Hoechst Celanese is scheduled to exclusively market in North America and Europe "Molsep" separator-membrane products supplied by Daicel Chemical. They said microporous PP film has been named "Celgard" by Daicel Chemical.

It has been applied to electrochemical products including batteries and capacitors, medical treatment, pharmaceutical production, biotechnology and filtration/separation membranes, etc. Its annual sales stand at ¥300-400 million.

Nadir separator membranes are produced from cellulose acetate, polysulphone or regenerated cellulose. They are extensively used in Europe but have yet to be marketed in large quantities in the States and Japan.

Molsep separator membranes are produced from cellulose acetate, polyether sulphone or polyacrylonitrile: they are used for producing ultrapure water, recycling valuable substances, concentrating/purifying fruit juice and refining enzymes and drugs. Their combined sales amount to ¥1-1.3 billion.

There are a great many firms both at home and overseas who have launched into separator-membrane business and they need to meet diversified demand as quickly as possible.

PRODUCTION/DEVELOPMENT BASE FOR BIOBUSINESS PLANNED

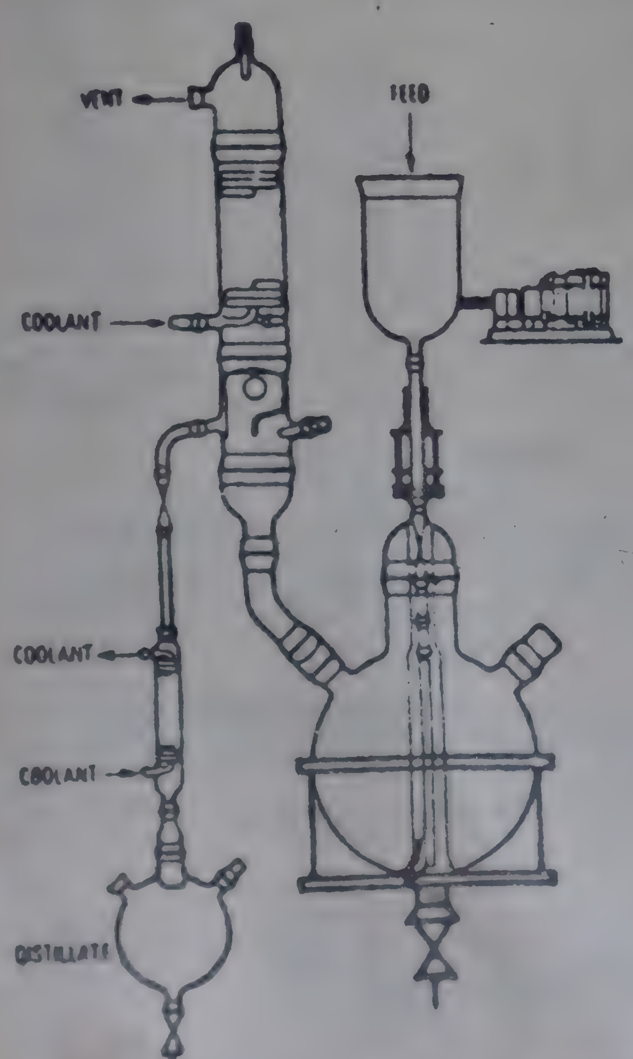
Oriental Yeast Co. is scheduled t build production facilities for biotech nology products and a related deve lopment center in an industrial zon located in Ina, Nagano Prefecture. Th company thereby intends to produc animal-source antiserum and antibodie including monoclonal and polyclon antibodies and also produce immun products on a commission basis.

In the planned development cente the company plans to pioneer ne immune products and breed laborato animals for special use through appl cation of transgenic technology.

The development center will be ope ated in combination with a research sub sidiary, which is raising rabbits fo laboratory use. The subsidiary compar — located near the industrial zon — supplies the parent company wi raw material for biotechnology pro ducts.

Oriental Yeast's biochemical opera tions began with development o enzymes and coenzymes (nicotinamid adenine dinucleotide, etc.) twenty yea ago. The company established six yea ago Life Tech Oriental Inc. in partne ship with Life Technology — a U. venture business for biotechnolog —and tied up with Atlantic Antibod (U.S.) and a Swiss firm for busine operations involving antiserum and fe mentation control equipment, respe tively.

The company's biotechnology bus ness is comprised of three sectors co ering biochemicals, bioresearc employing test animals and biopro cesses including biotechnology equi ment. The planned venture is aimed expanding utilisation of laboratory an mals, which is related to the first an second sectors.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MARKET INFORMATION

Market Steady

Low trading activity marked the week under review in the Bombay chemicals market. Easy availability of most commodities kept prices stable. With the rise in booking price of rangolite in the international market indigenous prices are expected to go up.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on January 31, 1990)

INDUSTRIAL CHEMICALS	Per Kg.
Ammonium sulphate	2.50
Ammonium phosphate (Mono)	14.50
Ammonium phosphate (Di)	14.00
Ammonium carbonate (Di)	17.00
Ammonium bicarbonate	5.60
Ammonium chloride	4.00
Ammonium nitrate	6.00
Arsenic white powder	22.00
Acrylamide (Resale)	70.00
Barium carbonate	6.00
Bleaching powder (33% Cl)	4.20
Borax (Granular)	18.00
Borax (Powder)	22.00
Boric acid (Tech)	26.00
Bisphenol-A	70.00
Butyl carbitol	110.00
Caustic soda (Flakes)	11.00
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	4.25
Calcium carbonate (Activated)	4.75
Cobalt oxide	300.00
Cresylic acid	62.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	43.00
Copper sulphate	25.00
Chromic acid	63.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	110.00
Hydro	40+ST

Hyflosupercell	20.00
Hexamine (Resale)	35.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	31.25
Lithopone	19.00
Magnesium chloride (Crystal)	3.00
Menthol crystal (Flakes)	355+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	18.00
Maleic Anhydride (Resale)	41.00
Mercury (34.5 Kgs)	11,500.00
Nickel chloride	110.00
Oxalic acid (Resale)	17.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	25.00
Potassium carbonate (Imported)	36.00
Potassium bichromate	32.00
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	115.00
Polyvinyl alcohol (No. 173)	115.00
Polyvinyl alcohol (No. 208)	150.00
Paraformaldehyde (Resale)	23.00
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	49.00
Paraffin wax	1[illegible]ST
Rangolite (German)	90+ST
Rangolite (Czech.)	70.00
Sodium sulphate (Fine)	3.70
Sodium sulphate (Coarse)	3.60
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	20.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	730.00
Sodium chlorite 80% (Spain)	95.00
Soda Ash (Tata)	4.80
Soda Ash (Birla)	4.50
Soda Ash (Imp.)	4.50
Sodium bicarbonate	7.50
Sodium bisulphite	7.50
Sodium silicate	3.00
Sodium acetate	8.00
Sodium alginate	320.00
Titanium Dioxide (Anatase)	80+ST
Titanium Dioxide (Rutile – RCR_2)	105+ST
Tartaric acid	112.00
Trisodium phosphate	5.50
Thiourea	83.00
Urea (Tech.)	2.90
Vacuum salt	1.00
Zinc Dust	32.00
Zinc Oxide	58.00
Zinc chloride powder (Tech.)	12.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.00
Acetic Anhydride (Resale)	37.00
Acetone (Resale)	18.00
Adipic Acid	70.00
Aceto Acetanilide	55.00
Aniline Oil	50.00
Benzoate Plasticiser	62.00
Butyl acrylate	84+ST
Butyl stearate	45.00
Butanol	32+ST
Benzyl Alcohol	60.00
Benzyl Chloride	34.00
Benzo trichloride	16.00
Benzoyl chloride	22.00
Bromine Liquid	65.00
Chloroform	31.00
Carbon Tetrachloride	21.00
Cellosolve	58.00
Cyclohexanone	54.00
Cyclohexanol	58+ST
Diacetone (Resale)	34.00
Diethyl Oxalate	34.00
Diethyl glycol (DEG)	30.00
Dioctyl Phthalate	45.00
Diallyl Phthalate	46.00
Dimethyl Phthalate	28.00
Dioctyl Adipate	52.00
Dibutyl Adipate	42.00
Dipentene	15.00
Dimethylamine 40%	52.00
Dimethylamine 50%	58.00
Ethyl Acetate	20.00
Ethyl Acrylate	72.00
Ethylene Dichloride	13.50
Ethylene Glycol	38.00
Formic Acid (Imp.)	24.00
Formaldehyde (Resale)	7.50
Glycerine (CP)	55.0
Glycerine (IW)	53.00
Hydrogen Peroxide 50% (Resale)	26.00
Isopropyl Alcohol	29.00
Isobutyl Alcohol (Resale)	30.00
Monoethanolamine (Resale)	90.00
Melamine	57.00
Methyl Ethyl Ketone	28.00
Methyl Isobutyl Ketone	38.00
Methyl Acrylate	66.00
Methylene Dichloride (Resale)	16.00

Meta Cresol	45.00
Nitrobenzene	25.00
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	36.00
Propylene Glycol	58.00
Polyethylene Glycol (No.200)	58.00
Polyethylene Glycol (No.400)	62.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	70.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	40+ST
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	29.00
Triethanolamine (Resale)	71.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	52.00

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	13.00
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	13.50
Xylene	18.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	170.00
Aceto Acetic Ester (Methyl)	70.00
Ammonium Molybdate	210.00
Anthraquinone	135.00
Anthranilic Acid	78.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	257.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	95.00
Bromamine Acid	550.00
BON Acid	130+Ex+Ta
Chicago Acid (Atul)	355.00
Coach Acid	52.00
C. Acid (Imp.)	210.00
Cyanuric Chloride	140.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	70.00
Diethyl Aniline	160.00
Diamino stilbene disulphonic acid	168.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	205.00
H. Acid (Atul)	115.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	350.00
J. Acid Urea	410.00
K. Acid	125.00
MPDS (German)	185.00
Meta Ureido Aniline	[illegible]
MPD (Local)	205.00
MPD (Japan)	240.00
Naphthenic Acid	25.00
N-Methyl J. Acid	580.00
N-Methyl Aniline	125.00
Naphthalene (Refined)	23.00
Ortho Anisidine (OA) (Imp.)	108.00
Ortho Dichloro Benzene (ODCB)	20.00
OT Base	130.00
Para Dichloro Benzene (PDCB)	32.00
Para Anisidine (PA local)	160.00
PNA	120.00
Para Cresidine (Imp.)	410.00
Para Amino Azo Benzene (India)	150.00
PNCB	62.00
Para Amino Acetanilide	190.00
1-Phenyl 3-Methyl 5-Pyrazolone	140.00
Phenyl J. Acid	340.00
Para Amino Benzoic Acid	165.00
PT Base	140.00
Rhoduline Acid	550.00
Resist Salt 80%	28.00
Resorcinol	210.00
Sodium Naphthionate	67.00
5-Sulpho-Anthranilic Acid	80.00
Sulphanilic Acid	33.00
Sulpho Tobias Acid	170.00
Trichloro Benzene (TCB)	24.00
Tobias Acid	166.00
Metanilic Acid	43.00
MTD	120.00

Bombay Dyes Market

(Prices as on January 31, 1990)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	422.40
Red FB	425.80
Red Violet FBL	622.00
Orange 3R	254.20
Violet 3R	370.50
Violet RL	355.70
Violet 6R	638.20
Scarlet RR	283.50
Rubine 3B	289.10
Rubine CB	449.50
Blue GL	419.00
Blue BGF	805.80
Navy Blue RE	359.90
Brown 3REL	272.80
Black GEL	420.10
Dark Brown 3B	411.10

BASE COLOURS	Per Kg.
Fast Yellow GC	77.75
Fast Orange GC	128.40
Fast Scarlet R	198.05
Fast Scarlet RC	128.40
Fast Scarlet RCR	105.60
Fast Scarlet G	115.75
Fast Scarlet GN	92.95
Fast Scarlet GG	77.75
Fast Scarlet GGS	73.95
Fast Red B	233.50
Fast Red RC	115.75
Fast Red R Flakes	158.80
Fast Red TR	181.60
Fast Red TR Oil	223.35
Fast Red RL	251.20
Fast Red KB Oil	251.20
Fast Bordeaux GP	236.00
Fast Garnet GBC	103.05
Fast Violet B	548.80
Fast Blue BB	566.50

NAPHTHOL COLOURS	Per Kg.
ASG	301.85
AS	205.65
ASSW	379.10
ASBS	253.75
ASBO	266.40
ASD	209.45
ASOL	243.60

ASTR	369.00
ASPH	336.05
ASE	236.00
ASEL	249.95
ASLB	2002.35
ASBT	2459.45
ASWG	143.00
ASSG	538.65
ASSR	652.60

PROCION COLOURS	Per Kg.
Golden Yellow HR	207.95
Brill. Yellow H4G	145.65
Supra Yellow H-8GP	168.55
Brill. Yellow HE6G	214.75
Yellow G-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	275.45
Yellow MGR	387.65
Brill. Yellow M4G	201.15
Brill. Yellow M8G	366.10
Yellow M3R	244.70
Brill. Orange H2R	303.80
Brill. Red H7B	157.95
Brill. Orange M2R	313.15
Brill. Red H8B	213.55
Brill. Scarlet H RN	245.05
upra Red H-3BP	179.80
rill. Red H-F3B	243.45
rill. Magenta HB	182.00
rill. Red M 5B	160.05
rill. Red M 8B	218.35
rill. Pink MB	137.10
ril. Magenta MB	163.65
rill. Purple H-3R	219.55
rill. Purple H-7R	175.40
avy Blue H 3R	333.75
ill Blue H-GR	406.40
ill. Blue H5G	207.95
ue H 5RX	286.20
ill. Blue H 7G	213.95
ill. Blue H 7RX	358.15
rquoise HA	265.05
pra Blue H-3RP	595.30
pra Turquoise H 2G P	181.50
Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: JAN. 25, (NNS) Mercury suffered a sharp fall of Rs. 400 at Rs. 10,800 per flask in the Delhi chemicals market during last week, in the absence of any buying interest by stockists and consumers as well as lower advices from Bombay, says NNS. In view of accumulation of stocks and fall in demand from textile units, chatkolite declined further by Rs. 1.50 at Rs. 52 per kg. Rangolite Germany, on the other hand, jumped up sharply by Rs. 5 at Rs. 90 per kg in the absence of fresh import from Germany.

Menthol medium and bold slumped further by Rs. 20 at Rs. 355 and Rs. 365 per kg respectively in the wake of dehoarding tendency by stockists. Menthol flake dropped by Rs. 15 at Rs. 330 per kg. Similarly due to poor enquiries, mentha oil and DMO eased by Rs. 5 each at Rs. 240/260 and Rs. 120 per kg.

Sodium nitrite suffered a set back of Rs. 50/100 thanks to increased profit taking selling by stockists. Sodium nitrite RCF and Deepak were quoted at Rs. 1,050 and Rs. 1,100. Borax granular and crystal declined by Rs. 10 at Rs. 825 each per 50 kg on withdrawal of demand. Caustic soda also slipped by Rs. 25 at Rs. 510 due to poor offtake. Titanium dioxide anatase slipped further by Rs. 2 at Rs. 82 due to fall in demand from plastic and paint units. RC-822 and K brand of Calcutta ruled quiet at their previous week level of Rs. 95 and Rs. 75 per kg.

In the absence of fresh import from France as well as increased demand from cheese manufacturers, tartaric acid France spurted sharply by Rs. 700 at Rs. 14,400 per 50 kg. Trishul brand tartaric acid also advanced by Rs. 100 at Rs. 4,250 per 15 kg.

Citric acid Bombay Dyeing looked up by Rs. 25 at Rs. 2,400 per 50 kg in the wake of increased offtake by consumers as well as reduced inflow. Citric acid of Chinese remained static at Rs. 2,100.

In view of poor supply and better demand, paraffin wax hardened by Rs. 10 at Rs. 870 while slack wax slipped by Rs. 100 at Rs. 8,200 per ton. Trisodium phosphate looked up by Rs. 25 at Rs. 625 due to tight supply and good demand from detergent powder manufacturers. Dyes and colours did not show any variation during the week.

(DELHI MARKET RATES AS ON JANUARY 25, 1990)

Ammonia Bicarb (Per 25 Kg.)	140.00
Mercury (Per flask)	11,800.00
Soda ash (Per bag)	340/355.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	510.00
Citric acid (Per 50 Kg.)	2,100/2,400.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCl (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	287/290.00
Sodium Hydrosulphite (Per Kg.)	34.00/36.50
Rangolite (Per Kg.)	90.00
Tartaric acid (Imp) (50 Kg.)	14,400.00
Sufolite (per Kg.)	67.00
Chatkolite (per Kg.)	52.00
DMO	120.00
Boric acid Technical (Per 50 Kg.)	1,350.00
Paraffin Wax (Per 50 Kg.)	870.00
Tartaric Acid (Indian Per 15 Kg.)	4,250.00
Borax Granular (Per 50 Kg.)	825.00
Borax Crystal (Per 50 Kg.)	825.00
Sodium Nitrite (Per 50 Kg.)	1050/1,100.00
Sodium Nitrate (Per 50 Kg.)	450.00
Camphor Thai (Per Kg.)	104.00
Camphor Powder (Per Kg.)	95.00
Menthol Bold (Per Kg.)	365.00
Menthol Medium (Per Kg.)	355.00
Menthol Flake (Per Kg.)	330.00
Menthol Oil (Per Kg.)	240/260.00
Glycerine (Per Kg.)	55/58.00
Sodium Silicate (Per quintal)	275/350.00
Hexamine (Per Kg.)	35.00
Acetic Acid Glacial (Per Kg.)	15.00
Copper Sulphate (Per quintal)	2,400/2,750
Formic Acid (Per Kg.)	24.00
Formaldehyde (Per Kg.)	8.50
Hydrogen Peroxide (Per Kg.)	25.75/26.25
Calcium Carbonate (Per Tonne)	2,500/4,000
Acid Slurry Soft (Per Kg.)	28.00
Acid Slurry Hard (Per Kg.)	38.00
Phosphoric Acid (Per 50 Kg.)	1,050.00
Potassium Nitrate (Per quintal)	900/1,200.00
Potassium Permanganate (Per 50 Kg.)	2,800/3,200.00
Sodium Bichromate (Per 50 Kg.)	1,575/1,600.00
Trisodium Phosphate (50 Kg.)	625.00
Titanium Dioxide Anatase (Per Kg.)	82.00
Titanium Dioxide RC-822 (Per Kg.)	95.00
Titanium Dioxide K-Brand (Per Kg.)	75.00
Titanium Dioxide RCR-2 (Per Kg.)	105.00
Zinc Oxide (Per metric tonne)	42,000/48,000.00
Phenol Carbolic Acid (Per Kg.)	37.00
Carbon Tetrachloride (Per Kg.)	24.75
Chloroform (Per Kg.)	28.00
Sodium Sulphate (Per metric tonne)	3,400/3,700.00
Naphthalene Balls (Per 50 Kg.)	1,450.00

DYES & COLOURS	(Per Kg.)
Naphthol AS	175/201.65
Naphthol ASG	180/295.20
Naphthol ASBS	210/248.45
Naphthol ASTR	275/360.45
Naphthol ASOL	210/238.60
Naphthol ASBO	195/260.75

DIRECT DYES	(Per Kg.)
Black E. Conc.	120/176.90
Diazo Black B.T.	105/147.55
Green B	90/140.55
Blue 2-B	60/101.40
Blue 2-B 225% (JNR)	125.00
Sky Blue FB	160/235.05
Basic Auramine	55/110.00
Basic Rhodamine	300/425.00
Basic Methylene Blue	100/180.00
Basic Violet	165/210.00
Basic Malachite Green	175.00
Acid Orange	75/111.20
Congo Red H/C	75/120.95

Madras Market

Markets were quiet. It is reported that production of titanium dioxide at TTP was good during the month but it has not reflected in the prices which maintained at old levels. Shortage of barium carbonate has been felt during this month with good enquiries from caustic soda manufacturers. It is reported that production of barium carbonate at one unit in Andhra Pradesh has been affected by labour strike and the pending export commitments have resulted in a temporary shortage of the material. Also, it is reported that few caustic soda manufacturers are switching over to use of other inputs instead of barium carbonate. In the solvent section availability of acetone had eased to some extent with a slight drop in the prices. There is no change in the prices of other items.

(MADRAS MARKET RATES AS ON JANUARY 27, 1990)

Acetic Acid Glacial (per kg)	15.00
Aluminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	150.00
Ammonium Chloride (per MT)	3,000.00
Acid Slurry (per kg)	31.00
Barium Carbonate (per kg)	9.00
Barium Chloride (per kg)	8.00
Boric Acid Technical (per kg)	24.00
Bleaching Powder (per 50 kgs)	225.00
Borax (per 50 kgs)	700.00
Caustic Soda Flakes – Mettur Chemicals (per MT)	10,500.00
Caustic Soda Flakes – Andhra Sugars (per MT)	10,500.00
Calcium Chloride 70% Solid (per MT)	3,000.00
Calcium Chloride Anhydrous (per MT)	5,600.00
Calcium Carbonate (Activated) (per MT)	6,000.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	130.00
Pure Para Cresol 96% (per kg)	85.00
Meta Para Cresol 42% (per kg)	50.00
Formic Acid (per kg)	26.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.50
Glycerine I.W. (per kg)	49.00
Hydrosulphite of Soda (TCPL) (per kg)	39.00
Hydrosulphite of Soda (IDI) (per kg)	42.00
Hydrosulphite of Soda (BASF) (per kg)	42.00
Hexamine (per kg)	30.00
Hyflosupercell (per kg)	19.50
Hydrogen Peroxide (per kg)	31.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	40.00
Magnesium Carbonate (per kg)	18.00
Magnesium Chloride (per kg)	3.75
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	375.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	17.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	25.50
Polyvinyl Alcohol Powder (per kg)	130.00
Pentaerythritol (per kg)	50.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	355.00
Soda Ash (TATA) (per 75 kgs)	355.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	14.00
Sodium Bisulphite (per kg)	4.50
Sodium Alginate (per kg)	225.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	3.50
Titanium Dioxide (Anatase) (per kg)	75.00
Titanium Dioxide (Rutile) (per kg)	90.00
Trisodium Phosphate (per kg)	7.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	50.00
Zinc Chloride Powder (per kg)	12.50
Zinc Sulphate (per kg)	8.00

SOLVENTS

Acetone -- HOCL (per kg)	20.00
Butanol (per kg)	34.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	14.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	22.00
Chloroform (per kg)	29.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	35.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	44.00
Di-N-butyl Phthalate (per kg)	44.00
Ethyl Acetate (per kg)	22.00
Isopropyl Alcohol (per kg)	29.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	20.00
Methyl Ethyl Ketone (per kg)	34.00
Methyl Isobutyl Ketone (per kg)	42.00
Phenol (per kg)	39.00
Sorbitol (per kg)	15.50
Triethanolamine (per kg)	90.00
Trichloroethylene (per kg)	25.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	16.00
Xylene (per lit)	25.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx. sailing dt. (5)
30/1	Baltik (Yug)	Oceanic	Jeddah; Rijeka.	10/2
10/2	Orient Express (Pan)(Voy-109)	Transworld/	Hodeidah; Djibouti; Port Sudan; Jeddah; Assab; Masawa; La Spezia; Naples, Malta; Beirut; Tartous; Mersin; Marseilles; Genoa; Vancia; Fos; Leghorn; Tilbury; London; Liverpool; Avonmouth; Birmingham; Manchester; Leeds; Dublin; Belfast; Antwerp; Hamburg; Bremen; Rotterdam; Le Havre; Aarhus; Gothenburg; Helsinburg. (Carting at CFS Cotton Avenue).	14/2
10/2	Tilia (Cyp)	U.L.A.	P. Sudan; Aden; Djibouti; Hodeidah. (Carting at 14-VD for Containers only)	
3/2	Medipas Star	L. Triest/	Jeddah; Barcelona; Marseilles; Genoa; Leghorn; La Spezia; Naples with TP Trieste; Venice; Ravenna; Bari; Koper; Rijeka; Las Palmas; Santacruz; De Teneriffe; Malta; Limmassol; Alexandria; Casablanca; Tunis; Algiers; Lattakia; Tripoli; Benghazi; Oran; Point E Pitre; Port de France. (Carting at M-171/173 Cotton Depot).	8/2
		Samrat/ Hindustan/	Barcelona; Marseilles; La Spezia; Livorno; (Leghorn); Genoa; Naples and other Italian ports and FCL only Beirut; Alexandria; Valletta; Lattakia; Mersin. (Carting at M.O.D. No. 1 for both).	
		Merzario	Genoa; Leghorn; La Spezia; Naples; Salerno; Marseilles; Barcelona. (Carting at M.O.D. No. 2).	
4/2	Eagle Star	F.F.C.Co.	Jeddah; P. Sudan; Hodeidah. (Carting at Timber Pond No. 1).	9/2
11/2	CMB Energy (Nhava Sheva)	C.M.B.	Djibouti; Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Carting at Kalamboli)	13/2
11/2	Nedlloyd Himalaya (Nhava Sheva)	Patvolk/ S.W. & Co. Trident/ P&O	Tilbury; London; Felixstowe; Avonmouth; Manchester; Liverpool; Glasgow; Leeds; Birmingham; Dublin; Belfast; Bristol; Marseilles; Genoa; Barcelona; Le Havre; Antwerp; Rotterdam, Hamburg; Bremerhaven; Copenhagen; Oslo; Helsinki; Malmao; Gothenburg; Stockholm; Aarhus; Alborg. (Carting at Kalamboli for all).	13/2
11/2	Tulsidas	S.C.I.	Colombo, Chittagong. (Carting at Timber Pond No. 1).	14/2
3/2	Medipas Star	L. Triest	Colombo. (Carting at M-171/173 Cotton Depot).	8/2
4/2	Eagle Star	F.F.C. Co.	Colombo; Ranghoon. (Carting at Timber Pond No. 1).	9/2
3/2	Ocean Sincerity (V-20A/B)(Lib)	O.S.A./	P. Kelang; Singapore; Kaohsiung; Hongkong; Bangkok; Kobe; Yokohama; Nagoya; Moji; Osaka; Busan; Tokyo; Simizu; Keelung; Tsingtao; Quindao; Xiangang; Shanghai. (Carting at M-178/180 Cotton Depot).	8/2
		M.S.P.L.	Singapore; Bangkok; P. Kelang; Penang; Jakarta; Manila. (Carting at Hay Bunder No. 4).	
11/2	Tulsidas	S.C.I.	Singapore and Far East ports. (Carting at Timber Pond No. 1).	14/2
In Port	Five Stars	Unimarine	Penang; Singapore.	8/2
4/2	Eagle Star (V-027)(Cyp)	F.F.C. Co.	Penang; P. Kelang; Singapore; Bangkok; Jakarta. (T. Priok); Hongkong; Manila; Busan; Keelung; Kaohsiung; Kobe; Yokohama; Nagoya; Osaka; Tokyo; Tsingtao; Dairen; Quangzhou; Whampoa; Shanghai; Hsingkang. (Carting at Timber Pond No. 1).	9/2
10/2	Orient Express (V-109)	Transworld/	P. Kelang; Penang; Keelung; Kaohsiung; Busan; Bangkok; Kobe; Manila; Djakarta. (Carting at CFS Cotton Avenue).	14/2
		N.L.S.	Far East; Japan and Chinese ports. (Carting at T.P. No. 4).	
6/2	Kamnik (Yug)	Depe	Hongkong; Keelung; (Kaohsiung); Kobe; Yokohama; Busan. (Carting at CFS Cotton Avenue for Containers only).	13/2
4/2	Eagle Star	F.F.C.Co.	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Caarting at T.P. No.1).	9/2

(1)	(2)	(3)	(4)	(5)
11/2	Tulsidas	S.C.I.	Melbourne; Fremantle; Adelaide; Sydney. (Carting at Timber Pond No. 1).	14/2
3/2	Ocean Sincerity	O.S.A./	Sydney; Melbourne; Adelaide; Brisbane; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting at M-178/180 Cotton Depot).	8/2
		P&O/ Killik	Melbourne; Sydney; Brisbane; Adelaide; Fremantle; P. Hobert; Devon P. Launceston; Burnie; P. Chalmers; Lyttelton; Christchurch; Dunedin; New Plymouth; Auckland; Wellington; Napier also Western Samoa; Papua; New Guinea; Solomon Island; American Samoa; Tonga; New Calidonia; Rabaul; P. Villa. (Carting at T.P.No. 4 for P & O) (Carting at M-178/180 Cotton Depot for Killick).	
In Port	Meghpal (Pan)	Unimarine	Dammam. (Carting at 4-VD).	8/2
4/2	Eagle Star(V-027)	F.F.C. Co.	Dubai; Sharjah; Abu Dhabi; Doha; Muscat; Dammam; Riyadh; Bahrain; Kuwait. (Carting at Timber Pond No.1).	9/2
10/2	Orient Express (V-109)(Pan)	Transworld/	Sharjah; Dubai; Abu Dhabi; Aiman; Doha; Kuwait; Dammam; Baghdad; Basrah; Syria and inland destinations in Gulf. (Carting at CFS Cotton Avenue).	14/2
		O.S.A./	Dubai; Abu Dhabi; Bahrain; Doha; Muscat; Kuwait; Dammam. (Carting at M-178/180 Cotton Depot).	
		Sai Ship	Dubai; Muscat; Sharjah; Abu Dhabi. (Carting at Wadi Bunder No. 3).	
11/2	CMB Energy (NS)	C.M.B.	Dubai; Abu Dhabi; Bahrain; Kuwait; Dammam; Doha. (Carting at Kalamboli).	13/2
7/2	Ardal (V-10)	Mackintosh	Dubai; Muscat.	14/2
11/2	CMB Energy (Nhava Sheva)	C.M.B.	Dar Es Salaam; Mombasa (Direct); Nacala; Tanga; Kampala; Blantyre; Lusaka; Ndola; Matwara; Lilongwe and all inland destinations in East Africa. (Carting at Kalamboli).	13/2
4/2	Eagle Star (V-027)	F.F.C.Co.	Los Angeles (Harbour); Longbeach; San Francisco; Oakland; Seattle Vancouver (B.C.); Portland; New York; Boston; Norfolk; Baltimore; Charleston; Savannah; Miami; New Orleans; Houston; Montreal; Toronto; Fortworth; Chicago; Nashville; Atlanta; Philadelphia; Milwaukee; Kansas City; Phoenix; Guam; Dallas; Cleveland; St. Louis; Cincinnati; Denver; Louisville; Memphis; Wilmington (BC); San Diego; Minneapolis; Indianapolis and Central American Ports; Honolulu. (Carting at Timber Pond No. 1).	9/2
10/2	Orient Express (Voy-109)	Transworld	Los Angeles; Longbeach; San Francisco; Oakland; Seattle; Vancouver; New York; Boston; Toronto; Montreal; Philadelphia; Norfolk; Baltimore; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston. (Carting at CFS Cotton Avenue).	14/2
3/2	Ocean Sincerity (V-20A/B)	O.S.A.	New York; Baltimore; Philadelphia; Houston; Boston; Chicago; Dallas; Atlanta; Savannah; Norfolk; Charleston; Los Angeles; San Francisco; Oakland; Seattle; Vancouver; Toronto; Montreal; Portland; Tacoma and South American and West Indies ports. (Carting at M-178/180 Cotton Depot).	8/2
11/2	CMB Energy (Nhava Sheva)	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans; Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli).	13/2
3/2	Medipas Star	Samrat/ Hindustan/ L. Triest	Boston; New York; Baltimore; Norfolk; Charleston; P. Mouth; P. Lauderdale; Miami; New Orleans; Savannah; Jacksonville; P. Everglades; Philadelphia; Halifax; Montreal; Toronto and South American ports. (Carting at M-171/173 Cotton Depot for L. Triest) (Carting at M.O.D. No. 1 for Samrat and Hindustan).	8/2
11/2	Nedlloyd Himalaya (Nhava Sheva)	Patvolk/ P&O/ S.W. & Co./ Trident	S. American ports. (Carting at Kalamboli for all). New York; Norfolk; Savannha; Baltimore; Boston; Charleston; Houston.	13/2
10/2	Orient Express (V-109)	Transworld	Monrovia; Lome; Lagos; Douala; Tema; Takoradi; Abidjan; San Pedro. (Carting at CFS Cotton Avenue).	14/2
3/2	Medipas Star	L. Triest	With T.P. Lagos/Apapa; Abidjan; Dakar; Douala; Cotonou; Nouakchott; Libreville; Tema; Matadi; Conakry; Freetown. (Carting at 171/173 Cotton Depot).	8/2
11/2	CMB Energy (Nhava Sheva)	CMB	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at Kalamboli).	13/2

(1)	(2)	(3)	(4)	(5)
11/2	Nedlloyd Himalaya (Nhava Sheva)	Patvolk/ P&O/ S.W. & Co.	West African Ports. (Carting at Kalamboli for all).	13/2

VESSELS DUE IN BOMBAY FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
12/2	Amer Shakti	S.C.I.	U.K. Cont.
9/2	Birgit Naber	Merzario/Samrat	U.K. Cont.
9/2	Kota Mutiara	Mackintosh	China/F. East
11/2	Nedlloyd Himalaya (N. Sheva)	Patvolk/S.W.& Co./Trident/P&O	U.K. Cont & U.S.A.
10/2	Nortween Berina	Sai Ship	U.K. Cont.
10/2	Regine	Sai Ship	Cont./Med.
10/2	S/o. Madhya Pradesh	S.C.I.	Med. ports.

Materials Exported

DRUG MATERIALS EXPORTED MADRAS 1.11.89 (Continued from previous issue)

DANAZOL USP: To Lucano: Tamilnadu Dadha Pharmaceuticals Ltd., 12 Kgs., Rs. 1,80,000.

ISONIAZID BP 80: To Antwerp: Veerchemie & Aromatic Pvt. Ltd., 2,000 Kgs., Rs. 2,93,400.

TRIMETHOPRIM: To Copenhagen: Inventaa Chemicals Pvt. Ltd., 1,000 Kgs., Rs. 5,08,896; To Hamburg: Inventaa Chemicals Pvt. Ltd., 3,000 Kgs., Rs. 15,24,526.

MATERIALS EXPORTED MADRAS (From 1.11.89 to 13.11.89)

CALCIUM SENNOSIDE: To Amsterdam: Kothari Phytochemicals Intl., 500 Kgs., Rs. 2,08,400; To Frankfurt: Kothari Phytochemicals Intl., 50 Kgs., Rs. 1,701.

HEXAMETHYL DISILAZANE: To Hamburg: Max India Ltd., 11,780 Kgs., Rs. 1,46,239.

L-CYSTINE: To FRG: Srinivasa Cystine Ltd., 7,000 Kgs., Rs. 19,22,490.

SENNOSIDE: To Frankfurt: Kothari Phytochemicals Intl., 100 Kgs., Rs. 1.86,000.

MATERIALS IMPORTED BOMBAY (From 8.12.89 to 11.12.89)

ACETYL ACETONE: From FRG: Indian Drugs & Pharmaceuticals Ltd., 2,812 Kgs., Rs. 12,67,590.

ACRYLAMIDE: From Japan: Deepak Dyes & Chemicals Industries, 1,000 Kgs., Rs. 25,431; Verb Chemical Industries, 5,000 Kgs., Rs. 1,27,156.

AEROSIL: From FRG: Organic Coatings Pvt. Ltd., 25,000 Kgs., Rs. 3,05,741.

ALDRIN TECH.: From Netherlands: Northern Minerals Ltd., 1,155 Kgs., Rs. 4,55,348.

AMINO ANISIC ACID ANILIDE: From Japan: Colour Chem Ltd., 1,500 Kgs., Rs. 5,60,812.

ARSENIC TRIOXIDE: From Korea: Prashant Glass Works P. Ltd., NA., Rs. 6,70,165.

N-BUTYLAMINE: From FRG: IDI Ltd., 580 MTs., Rs. 23,738.

N-BUTYRIC ACID: From FRG: Arofine Chemicals Inds., 1,000 Kgs., Rs. 24,904.

CHROMIUM OXIDE: From FRG: Oblum Electrical Inds. P. Ltd., 600 Kgs., Rs. 84,900.

PARA CRESIDINE: From Japan: Metrochem Inds., 5,000 Kgs., Rs. 8,20,265.

2-CYANO 4-NITRO ANILINE: From China: Colour Chem Ltd., 1,000 Kgs., Rs. 2,26,804.

3-CYANOPYRIDINE: From USA: Veer Chemie & Aromatics P. Ltd., 5,000 Kgs., Rs. 3,72,992.

CYANURIC CHLORIDE: From Belgium: Sanjay Trading Co., 12 MTs., Rs. 4,26,926; Suchde Trading Co., 12 MTs., Rs. 4,26,926.

N,N-DIETHYLANILINE: From Japan: Jindal Dye Intermediate P. Ltd., 15,200 Kgs., Rs. 8,31,202.

DIETHYL SULPHATE: From Japan: Supreme Sales Corpn., 3,450 Kgs., Rs. 86,128.

DIMETHYL FORMAMIDE: From Japan: Atul Products Ltd., 4,940 Kgs., Rs. 99,667.

ETHOXY METHYLENE DIETHYL MALONATE: From FRG: Cipla Ltd., 5,000 Kgs., Rs. 10,68,111.

ETHOXY METHYLENE MALONIC ACID ESTER: From FRG: Lakme Ltd., 800 Kgs., Rs. 17,08,978.

GLUTAMIC ACID: From France: Pharmaceutico, 5,000 Kgs., Rs. 39,406.

HEPTACHLOR TECH. 73%: From USA: Rallis India Ltd., NA, Rs. 4,22,040.

L-BASE: From China: Metox Fine Chemicals P. Ltd., 3,000 Kgs., Rs. 25,53,930.

L-LYSINE MONO HCl USP: From Korea: Dilipkumar & Co., 1 MT., Rs. 97,487.

DL-MALIC ACID: From Japan: Grauer & Weil (India) Ltd., 1,000 Kgs., Rs. 35,664.

N-METHYL ACETO ACETAMIDE: From Japan: Khatau Junker Ltd., 16,000 Kgs., Rs. 4,41,279.

PHOSPHOROUS OXYCHLORIDE: From UK: The Central Electronics, NA, Rs. 1,09,252.

PIVALOYL CHLORIDE: From France: Kiran Chemicals, 1,082 Kgs., Rs. 75,188.

N-PROPYLAMINE: From FRG: Unimedix P. Ltd., 3,080 Kgs., Rs. 1,23,275.

PROPYLENE GLYCOL USP: From USA: C.J. Shah & Co., 50.31 MTs., Rs. 10,66,003.

SOYA LECITHIN: From Israel: Sparkling Investment & Trading Co., 16 MTs., Rs. 1,22,070; From USA: Prakash Pipes & Inds. Ltd., 362 Kgs., Rs. 54,400; Tony Electronics Ltd., 2,000 Kgs., Rs. 2,28,272.

SODIUM CARBOXYMETHYL CELLULOSE: From Switzerland: Ewac Alloys Ltd., 380 Kgs., Rs. 3,20,699.

SODIUM FORMALDEHYDE SULPHOXYLATE: From China: Amar Trading Corpn., NA, Rs. 2,87,606.

SODIUM GLUCONATE: From Netherlands: Grauer & Weil India Ltd., 2,000 Kgs., Rs. 4,88,288.

TITANIUM DIOXIDE: From Singapore: Coates of India Ltd., 170 Kgs., Rs. 7,92,606.

TRIETHYLAMINE: From Brazil: Lupin Labs Ltd., 10,512 Kgs., Rs. 3,70,118.

3,4,5 TRIMETHOXY BENZALDEHYDE: From China: Shaba Chemical P. Ltd., 1,000 Kgs., Rs. 3,40,693.

PLASTIC MATERIALS IMPORTED BOMBAY (From 8.12.89 to 11.12.89)

HDPE: From Czechoslovakia: Associated Plastic Inds., 125 MTs., Rs. 13,37,460; Fibro Plast Corpn., 87.5 MTs., Rs. 7,80,185; Naresh Paper Bag Co., 12.5 MTs., Rs. 1,11,455; From Saudi Arabia: Abco Plastics, 17.15 MTs., Rs. 2,09,350; Calcutta Rope Stores, 17,150 Kgs., Rs. 2,06,442; Dawood & Dawood P. Ltd., 17.15 MTs., Rs. 2,09,349; Grover Overseas P. Ltd., 17.15 MTs., Rs. 2,20,980; Gupta Plastic Udyog, 34.3 MTs., Rs. 4,15,792; New Horizon Office Corpn., 17.15 MTs., Rs. 2,20,980; Plastic Processors, 51.45 MTs., Rs. 6,38,226; Raheja Mercantile Corpn., 51.45 MTs., Rs. 6,62,940; Ravi International, 1,20,050 Kgs., Rs. 14,24,738; Satyanarayan Plastics Inds., 51.45 MTs., Rs. 6,19,326; Sirigiri Plastic Inds., 51.45 MTs., Rs. 6,19,326; Southern Union Plastic Inds., 34.30 MTs., Rs. 4,12,884; Top-O-Plast, 17.15 MTs., Rs. 12,09,350; From Spain: Anand Chemical Corpn., 48 MTs., Rs. 5,85,624; Milton Plastics, 96 MTs., Rs. 11,71,872; Plasto Metal, 17.15 MTs., Rs. 12,09,350; Tainwala Chemicals & Plastics, 48 MTs., Rs. 5,85,936; Vishal Plast Enterprises, 96 MTs., Rs. 11,71,872; From Sweden: Hindustan Cables Ltd., 152.4 MTs., NA; From USA: Climax Synthetics P. Ltd., 20.412 MTs., Rs. 2,09,371; Columbia Leasing & Finance P. Ltd., 153 MTs., Rs. 18,75,645; Pan Asia Intl. P. Ltd., 40.804 MTs., Rs. 4,25,662; Southern Marketing Associates, 40.89 MTs., Rs. 4,26,352.

LDPE: From Netherlands: Duropack Ltd., 15,120 Kgs., Rs. 2,03,450; From Qatar: Hari Vishnu Packaging Ltd., 49.5 MTs., Rs. 6,21,030.

LLDPE: From Korea: Calico Dyes

Chem Ltd., NA, Rs. 8,83,316; Vishal Plastomer P. Ltd., NA, Rs. 2,51,284; From Saudi Arabia: Amar Plastics, 16.5 MTs., Rs. 1,67,846; Bothra Inds., 16.5 MTs., Rs. 1,76,238; Fusion Polymers Ltd., 16.5 MTs., Rs. 1,81,834; K. Raheja Mercantile Corpn., 16.5 MTs., Rs. 1,76,238; Manoj Plastic, 33 MTs., Rs. 3,55,274; Polychroic Inds., 99 MTs., Rs. 8,43,858; From USA: SPC Inds. P. Ltd., 16 MTs., Rs. 2,98,393; Shree Plastic Inds., 16.5 MTs., Rs. 1,72,327; Siddharth Plastics, 33 MTs., Rs. 3,44,084.

PVC RESIN: From Argentina: Amar Plastics, 1,000 MTs., Rs. 11,69,835; Gulshan Sugars & Chemicals Ltd., 50 MTs., Rs. 5,93,395; Selfshine Inds., 200 MTs., Rs. 23,72,180; From Brazil: Precision Extrusions, 33.5 MTs., Rs. 6,48,670; Sanghi Leathers P. Ltd., 50 MTs., Rs. 6,21,657; From Japan: Caprihans India Ltd., 17 MTs., Rs. 7,64,632; From Korea: Raj Pipes Ltd., 150 MTs., Rs. 19,15,704; The Supreme Inds. Ltd., 300 MTs., Rs. 35,98,422; From Singapore: Shiv Shakti Enterprises, 13.95 MTs., Rs. 1,65,557.

POLYPROPYLENE: From Austria: Jain Irrigation Systems Ltd., 15 MTs., Rs. 2,13,463; N.R.C. Ltd., 14,000 Kgs., Rs. 2,08,913; VIP Inds. Ltd., 15 MTs., Rs. 2,29,174; From Belgium: Panorama Plastics, 30 MTs., Rs. 3,56,028; Premium Plastic & Allied Inds., 15 MTs., Rs. 25,312; Rising Star Plastics P. Ltd., 5 MTs., Rs. 5,34,057; Vikram Plastics, 0 MTs., Rs. 3,56,038; From Brazil: amath Packaging Ltd., 300 MTs., s 46,68,144; From Spain: Orient Intl., 5 MTs., Rs. 5,22,612; From USA: oughton Hard Castle (I) Ltd., 5,400 os., Rs. 1,40,074; P.K. Plastic Inds., .65 MTs., Rs. 2,10,089; Print Pack ckaging, 16.65 MTs., Rs. 2,09,982; ajasthan Petro Syn. Ltd., 30 MTs., . 4,88,280; Subhash Corpn., 153.09 Ts., Rs. 16,22,196; From Yugoslavia: asto Metachem I. P. Ltd., 155 MTs., . 19,82,410.

POLYSTYRENE: From Korea: indco Sales P. Ltd., 24 MTs., Rs. 6,17,186; Gujarat State Export Corpn. Ltd., 330 MTs., Rs. 46,57,719; Pan Asia Intl. P. Ltd., 51 MTs., Rs. 7,50,612; Progressive Trading Co., 54 MTs., Rs. 7,96,506; Raheja Mercantile Corpn., 68 MTs., Rs. 10,03,178.

POLYSTYRENE HIGH IMPACT: From Korea: Gujarat State Export Corpn. Ltd., 340 MTs., Rs. 47,98,854.

DRUG MATERIALS IMPORTED BOMBAY (From 8.12.89 to 11.12.89)

MORPHOLINE: From USA: Polyolefins Inds. Ltd., 15.6 MTs., Rs. 5,42,575.

SULPHADIAZINE: From China: A. Ltd., 2,350 Kgs., Rs. 5,85,997.

MATERIALS IMPORTED BOMBAY 15.12.89

ALPHA ACETO GAMMA BUTYRO LACTONE: From Japan: IDPL, 10,000 Kgs., Rs. 14,45,713.

ALUMINIUM HYDROXIDE: From FRG: Incab Inds. Ltd., 29.6 MTs., Rs. 6,19,808.

ALUMINIUM OXIDE: From Japan: Samtel Colour Ltd., 6,000 Kgs., Rs. 3,20,850.

4-AMINO DIPHENYL ANILINE: From Japan: Bayer India Ltd., 16,000 Kgs., Rs. 14,91,965.

AMMONIUM CHLORIDE: From USA: Khandelwal Hermann Elect Ltd., 666 Kgs., Rs. 68,872.

AROMATIC CHEMICALS: From Switzerland: M.C. Davar Aromatic Pvt. Ltd., 200 Kgs., Rs. 62,456.

CALCIUM CARBONATE: From France: Finolex Cables Ltd., 21 MTs., Rs. 81,061.

CARBAZOLE PURE: From FRG: Dipen Industries, 1,000 Kgs., Rs. 74,612.

CARBON BLACK: From FRG: Marigold Paints, 600 Kgs., Rs. 1,20,727.

PARA CUMIDINE: From Japan: Montari Industries Ltd., 15,200 Kgs., Rs. 11,11,281.

2 CYANO PYRAZINE: From Japan: Artemis Pharmaceuticals Pvt. Ltd., 200 Kgs., Rs. 1,18,487.

DIETHYL HYDROXYLAMINE: From FRG: ABS Plastics Ltd., 181 Kgs., Rs. 27,311.

DIMETHYL FORMAMIDE: From FRG: Gujarat Lyka Organics Ltd., 14.82 Kgs., Rs. 3,13,890.

2-ETHYL HEXANOIC ACID: From Japan: J. Kirit & Bros., 7,200 Kgs., Rs. 1,18,469; Kirti & Brothers, 7,200 Kgs., Rs. 1,18,469.

ETHYLENE GLYCOL: From Saudi Arabia: Modipon Fibres Co., 97.2 MTs., Rs. 17,03,022.

GAMMA FERRIC OXIDE: From USA: Letape India Pvt. Ltd., 9,872 Kgs., Rs. 5,88,302.

FORMAMIDE: From FRG: Lupin Labs Ltd., 18,400 Kgs., Rs. 4,40,363.

IODINE CRUDE 99.5% MIN.: From Japan: Multichem Labs, 500 Kgs., Rs. 1,67,846.

IRON OXIDE: From FRG: Asian Paints India Ltd., 10,000 Kgs., Rs. 3,25,404.

ISOOCTYL THIOGLYCOLATE: From FRG: Shital Chemicals Pvt. Ltd., 3,570 Kgs., Rs. 1,84,908.

LILIAL: From Switzerland: Quest International India Ltd., 190 Kgs., Rs. 53,498.

LITHIUM HYDROXIDE MONO-HYDRATE: From USA: Turbhe Chemicals Pvt. Ltd., 2,200 Lbs., Rs. 77,769.

L-LYSINE MONO HCl USP: From Korea: K. Sevantilal & Co., 1,000 Kgs., Rs. 99,182.

MANGANESE ACETATE: From UK: Reliance Inds. Ltd., 18 MTs., Rs. 4,34,286.

MERCURY MIN. 99.99%: From Turkey: Middle East Trading Co., 50 Nos., Rs. 2,05,569.

METHANE SULPHONYL CHLORIDE: From USA: Glaxo India Ltd., 544.32 Kgs., Rs. 41,504.

MURIATE OF POTASH: From GDR: Indian Potash Ltd., 18,000 Kgs., Rs. 4,40,33,461.

NITRO AMINO PARA CRESOL: From Japan: IDI Ltd., 620 MTs., Rs. 2,83,122.

PARA OCTYL PHENOL: From Japan: United Pestichem & Nonionics, 5 MTs., Rs. 1,18,679.

PARA TOLUIDINE META SULPHONIC ACID: From Korea: PDI Chemicals Ltd., 3,000 Kgs., Rs. 1,95,821.

POLYVINYL ALCOHOL: From Japan: Jigma Zyntex Pvt. Ltd., 20 Kgs., Rs. 815; From USA: The Mafatlal Fine Spg. & Wvg. Mills, 18,000 Kgs., Rs. 6,86,642.

PROPARGYL ALCOHOL: From FRG: Glaxo India Ltd., 2,850 Kgs., Rs. 3,56,692.

SILICA PRECIPITATED: From FRG: Gopal Bros., 4,325 Kgs., Rs. 2,48,240.

SILICON METAL: From China: Eshwar Metals, 18,000 Kgs., Rs. 3,68,262.

SODIUM FORMALDEHYDE SULPHOXYLATE: From China: Aryl Chemicals, 32 MTs., Rs. 4,69,292; Kiran Trading Co., 16 MTs., Rs. 2,44,140.

SODIUM LAURYL SULPHATE: From FRG: Climax Intl. Corpn., 11,000 Kgs., Rs. 3,86,537.

THIOPHENOL: From USA: Hoechst India Ltd., 621.33 Kgs., Rs. 77,862.

TITANIUM DIOXIDE: From Japan:

Goodlass Nerolac Paints Ltd., 16,000 Kgs., Rs. 7,18,855; From USA: Bankim Inds., 18,140 Kgs., Rs. 8,30,380.

TOLUENE DIISOCYANATE: From USA: Tirupati Foams Pvt. Ltd., 15.962 MTs., Rs. 5,80,484.

2,4-XYLIDINE: From Switzerland: IDI Ltd., 2,000 Kgs., Rs. 1,44,367.

PLASTIC MATERIALS IMPORTED BOMBAY 15.12.89

HDPE: From Japan: Polychroic Inds., 16 MTs., Rs. 2,15,894; From Saudi Arabia: Brite Automotive & Plastics Ltd., 51.85 MTs., Rs. 6,36,771; Brite Bros. Ltd., 17.15 MTs., Rs. 2,12,257; From USA: Saraogi Plybreels Pvt. Ltd., 15 MTs., Rs. 1,58,943; From Korea: Amar Plastics, 100 MTs., Rs. 12,61,840.

LDPE: From Korea: Synthetic Colour Chem Inds., 20 MTs., Rs. 2,53,082; Vishal Plastomer Pvt. Ltd., 30 MTs., Rs. 3,77,726; From Saudi Arabia: The East African Traders, 16.5 MTs., Rs. 1,66,447; From USA: Rustagi Enterprises, 24.525 MTs., Rs. 2,43,244.

LLDPE: From Saudi Arabia: The East African Traders, 16.5 MTs., Rs. 1,66,447; Pradeep Indl. Packers P. Ltd., 16.5 MTs., Rs. 1,68,887; Sonia International, 115.5 MTs., Rs. 11,45,550; From Netherlands: The Supreme Inds. Ltd., 90 MTs., Rs. 11,74,922.

MDPE: From France: Gujarat Inject Ltd., 16 MTs., Rs. 2,33,289.

POLYPROPYLENE: From Australia: Gujarat Propack Ltd., 1,28,000 Kgs., Rs. 18,22,910; From Belgium: Furn Plastic Inds. Ltd., 75 MTs., Rs. 11,28,463; Garware Wall Ropes Ltd., 45 MTs., Rs. 4,49,314; Rajasthan Petro Synthetics Ltd., 30 MTs., Rs. 3,82,684; From France: Mupnar Films Ltd., 16.25 MTs., Rs. 3,27,585; From Japan: MP United Polypropylene Ltd., 30 MTs., Rs. 8,64,662; The Supreme Industries Ltd., 16 MTs., Rs. 3,61,557; From Korea: Amar Plastic Inds., 17 MTs., Rs. 2,47,869.

POLYSTYRENE EXPANDABLE: From Korea: Sureka Insulation & Packagings, 12 MTs., Rs. 3,05,648; From Netherlands: The Supreme Inds. Ltd., 10 MTs., Rs. 2,67,028.

STYRENE MONOMER: From Brazil: J. Kirit & Bros., 17.6 MTs., Rs. 2,61,093; From USA: Kaylex Chemicals, 17,600 Kgs., Rs. 2,87,201.

DRUG MATERIALS IMPORTED BOMBAY 15.12.89

AMPROLIUM HCl USP: From USA: Merind Ltd., 2,000 Kgs., Rs. 9,15,524.

ERYTHROMYCIN THIOCYANATE: From USA: Anu Pharma Pvt. Ltd., 527.22 Kgs., Rs. 4,72,004.

FURAZOLIDONE NF: From Japan: Tata Exports Ltd., 2,000 Kgs., Rs. 2,71,266.

PENICILLIN G POTASSIUM: From France: Ranbaxy Labs Ltd., 12,800 Nos., Rs. 32,55,195.

DRUG MATERIALS EXPORTED MADRAS (From 15.11.89 to 20.11.89)

CALCIUM LACTATE USP: To Korea: Tamilnadu Dadha Pharm. Ltd., 3,000 Kgs., Rs. 67,143.

ERYTHROMYCIN ESTOLATE BP 88: To Denmark: Pradeep Drug Co., 400 Kgs., Rs. 3,90,600.

ERYTHROMYCIN STEARATE BP 88: To Denmark: Pradeep Drug Co., 500 Kgs., Rs. 4,28,500; To FRG: Pradeep Drug Co., 500 Kgs., Rs. 4,10,000.

IBUPROFEN BP 88: To FRG: Shasun Drugs Ltd., 6,000 Kgs., Rs. 13,88,304.

Edited by R. Raghavan and published by N. R. Rajagopalan on behalf of owners, Sevak Publications, 306, Shri Hanuman Industrial Estate, Wadala, Bombay-400 031, Phone: 4120743/4131198. Madras Office: 27, Begum Sahib 3rd Street, 1st Floor, Mount Road, Madras-600 002. Phone: C/o. 831808 and printed by N. R. Rajagopalan, at Sevak Publications, 25, North Mada street, Thiruvanmiyur, Madras-600 041. Phone: 419265. Registered with Registrar of Newspapers for India vide No. R N 1972/57


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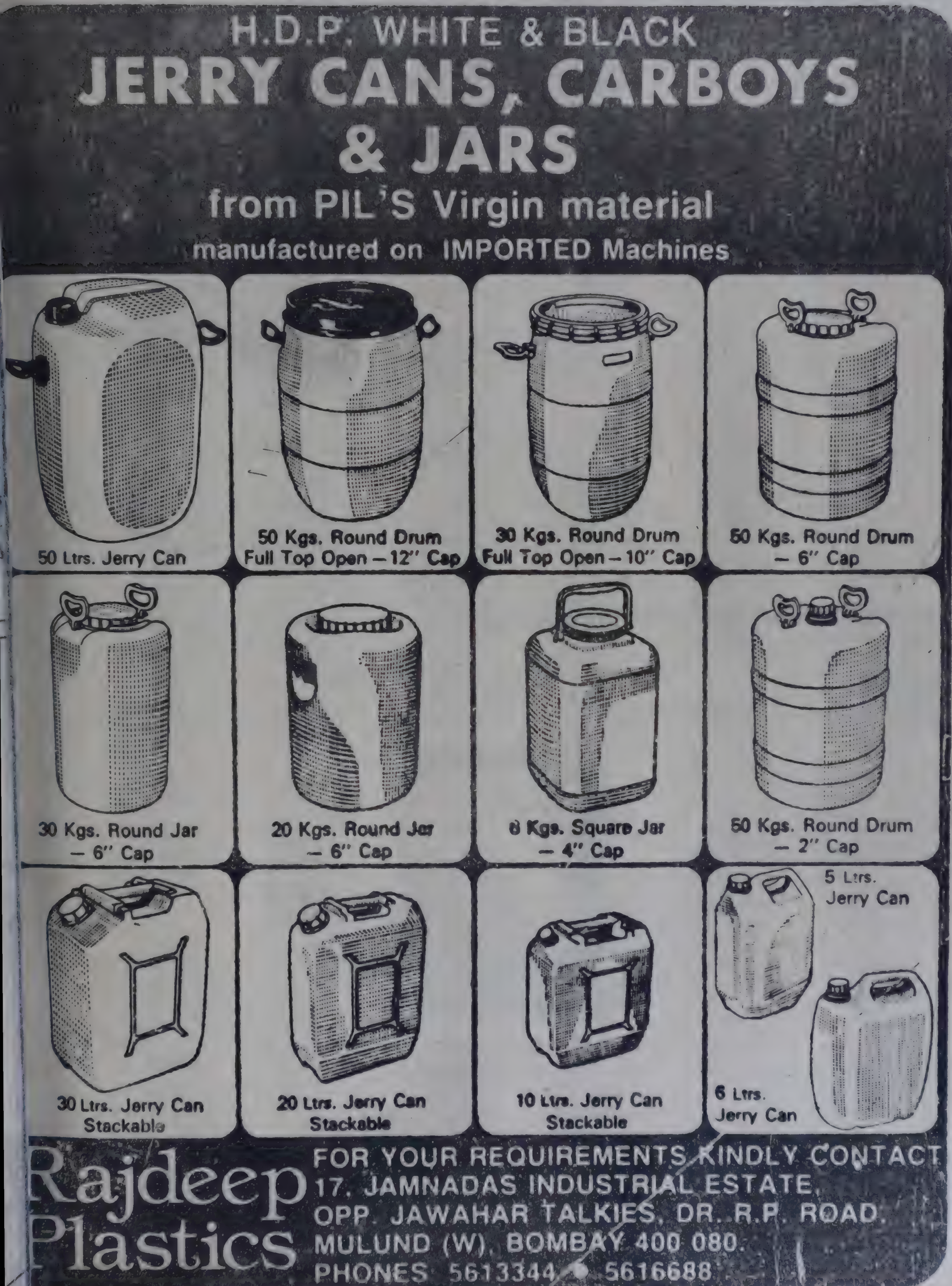
35th YEAR OF PUBLICATION

Chemical Weekly

VOL. XXXV | FEBRUARY 13, 1990 | NO. 23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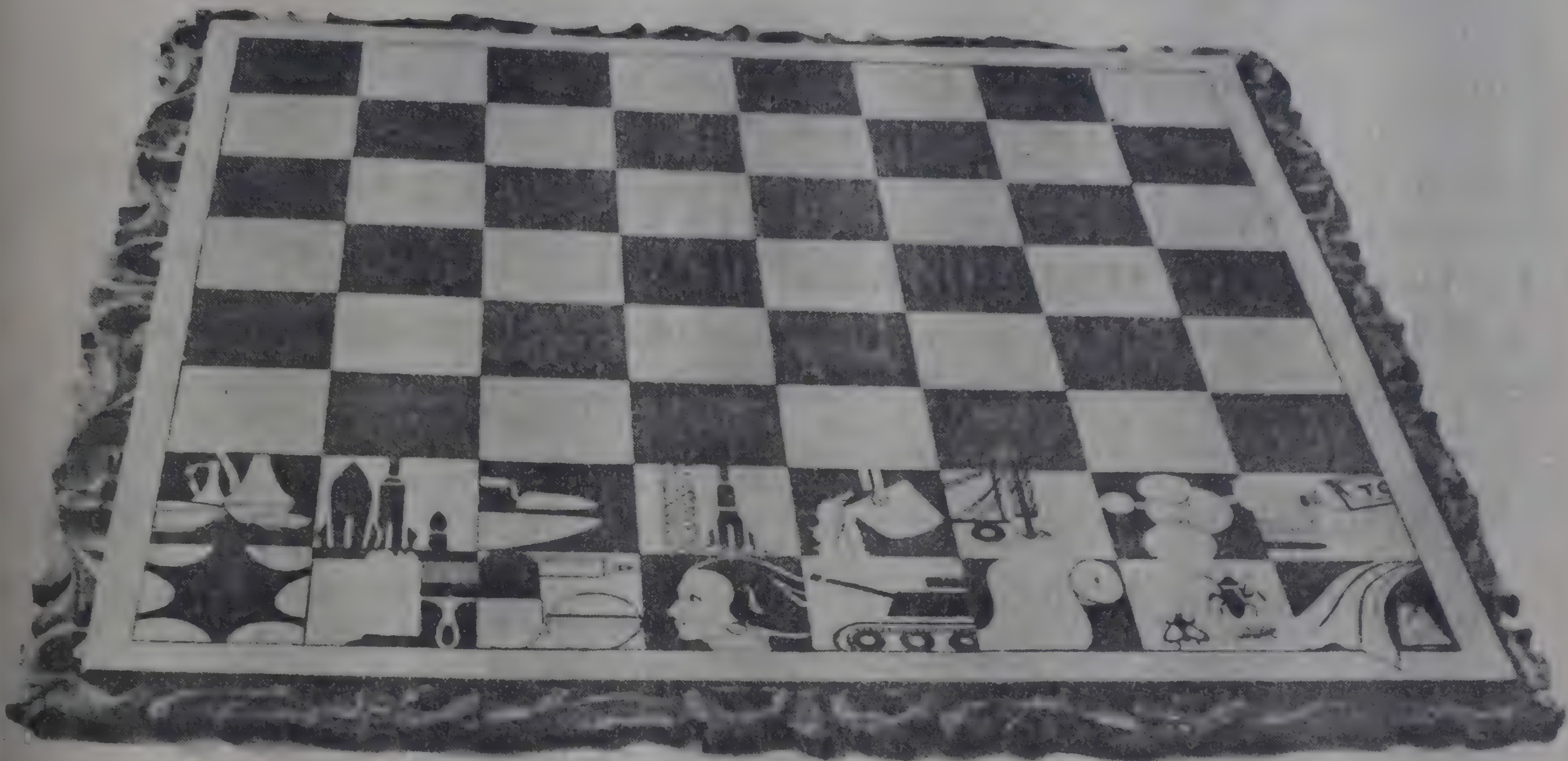


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CHEMICAL WEEKLY

VOL. XXXV FEBRUARY 13, 1990 NO. 23

HERALDING THE 21st CENTURY - 36

Giant Strides ahead in Battery Technology

Engineers designing electrical and electronics equipment, for electric traction vehicles to portable radios for domestic or military use, have always been frustrated by the weight and size of batteries that have to be carried. Now under development at Britain's largest laboratories, in collaboration with other scientists in the U.K. and in Denmark, is an all-solid-state rechargeable lithium battery which will bring pollution-free driving a great deal nearer and may trigger many new and exciting ideas for better-powered equipment.

The battery powered electric vehicle (EV) is already in use in many countries. It is successful where it needs to work only over a short range and its low speed is acceptable in built-up areas, where it has the added advantage over the internal combustion engine of not causing pollution. It is efficient and convenient for continual stop-start operation and a commercial fleet of such vehicles is easy to maintain.

On the other hand, its restricted performance causes considerable frustration to motorists who meet it on the open road, for it cannot travel at the speed of the rest of the traffic. So the view of the general public is that electric vehicles have a poor performance and are acceptable only for specialist duties in localised areas.

It is the source of power, the battery, which lies at the heart of the problem. To put it simply, traction batteries are too heavy and too large for the amount of energy they store or the power they can provide: a large fraction of the energy stored in a typical traction battery is needed just to propel the battery itself.

For practical purposes, the present choice of batteries for EV traction is between two systems, each employing an aqueous electrolyte, which is either lead/acid or nickel/iron. Over the last 25 years significant improvements have been made in the performance of existing systems and of vehicles with good short-range, traffic compatible capabilities. Most of the vehicles now available are urban delivery vans but one of the latest is a version of the popular Peugeot 205 car, powered by a nickel/iron battery.

The performance offered by the enormous energy density of liquid fuels like petroleum, with more than 10,000 Wh/kg (watt hours per kilogram) compared with 20-40 Wh/kg for lead/acid traction batteries and a high-rate recharge capability (two minutes at the pump in contrast to a battery charge of several hours), will never be matched by that of any battery system, in spite of an on-board energy conversion efficiency that is five times better. However, if a battery were available with high energy density (100 to 200 Wh/kg) it would a significantly affect the practical value of EVs in a wide variety of applications from wheelchairs and bicycles to commuter cars, taxis and delivery vehicles with greater load carrying capability and of lighter construction.

The Agency of Industrial Science and Technology is scheduled to develop new-type batteries for electric vehicles and related hybrid systems. Targeted batteries are sodium/sulphur-, zinc/bromine-, nickel/zinc-, nickel/iron- and nickel/cadmium- based ones. In the said hybrid systems, the new-type batteries will be combined with conventional fuel cells and the Stirling engine. Electric Vehicles are mostly used in the form of off-road vehicles including golf carts. In Japan, only about 700 units -- accounting for 0.7% of all electric vehicles combined -- are employed as on-road vehicles such as garbage trucks.

Lead-based batteries are used for most of the electric vehicles now in use but it is impossible to further improve the capabilities of this type of battery. Similar problems are to be found in other technologically important areas. The vast demand for portable electronics equipment in the computing and communications fields brings with it a need for small, lightweight, rechargeable power sources.

It is not only important to achieve lower absolute weights and smaller volumes, to avoid the hand held cellular radio-telephone or 'wrist-watch' device having a suitcase-size battery, but to be able to provide batteries that are suitably shaped, too. For example, a flat-screen television ideally requires a flat battery pack. There are also growing markets in the telecommunications and other industries for standby power sources. Here, too, there is a trend towards smaller electronics packages and correspondingly small power sources.

Ni/Cd batteries have been used traditionally in these markets and, more recently, Ni/H_2 batteries too, for space applications such as power sources for satellites where cycle life and reliability are also of prime importance; but the low energy densities so far achieved-have restricted the electrical load capabilities of missions. Space stations and deep space probes will require power sources with higher

energy densities. Much better energy densities are theoretically available from alkali-metal couples, but materials problems have restricted their use mainly to primary battery systems and to secondary batteries operating at high temperature. Of the latter, the sodium/sulphur battery is the best developed.

However, sodium/sulphur batteries are still not commercialy available, even after some 17 years' research and development by large teams of scientists around the world. Remaining problems include the reproducibility of manufacture and reliability in use of beta-alumina ceramic tubes, and the thermal control and safety of large batteries. High temperature systems of this kind will, even if successful, be useful only where large batteries are needed.

With an increasing number of businesses relying on battery technology to power such indispensable tools as portable computers, radio-pagers and mobile telephones, the limited life of battery cells has become more than an inconvenience.

The news from the World's battery manufacturers is that developments are under way to introduce a lighter, more powerful all purpose battery in the Nineties. It will be based on lithium, a metal already used in some specialist batteries. In the meantime, developments in longer life and rechargeable batteries, particularly for cordless domestic equipment, are making life easier for consumer and businessman alike.

Batteries are classified under two categories: primary, which is used only once, and rechargeable. The main primary ones are:

* zinc carbon, the older type of consumer battery;
* alkaline, similar to zinc carbon but longer lasting;
* silver oxide and silver alkaline, button cells used to power calculators or watches;
* lithium, which is increasingly replacing the silver battery in cameras and remote control units for televisions;
* Zinc air, a button cell in which a zinc anode reacts with oxygen from the air. It incorporates a membrane with holes big enough to allow the oxygen to pass through, but too small to allow the electrolyte to leak out. It is most efficient when used continuously, in hearing aids, or radio-pagers.

Rechargeable batteries come in two types: lead acid, mainly used in cars, and nickel cadmium (NiCd). The latter is used in portable computers, mobile telephones and rechargeable domestic appliances, such as torches and drills, as well as for batteries which can be recharged at home. In the business market, almost all hand-held cellular telephones and the more expensive lap-top computers use rechargeable nickel cadmium cells. Although cheaper to use in the long run than primary batteries, they run for a shorter time before they need recharging.

Batteries for most cellular telephones last for up to 10 hours, but calls can be made and received for only about two hours during that period. Toshiba, the Japanese electronics company, claims that its lap-top computers can be used continuously for up to 10 hours, while portables from Compaq, of the U.S. run for four hours before the batteries need recharging. The spread of portable equipment has made the battery problem more acute. There are now nearly 300,000 portable computers in Europe, and that figure is set to exceed million in just over two years'time, according to the Paris-ba research organisation. Intelligent Electronics/Dataquest. In Bri alone, battery-powered mobile telephones number nearly 200. -- a figure which is growing by 5,000 a month.

The problem has been exacerbated in the U.S. and Europe bec battery and equipment manufacturers are independent compa and, therefore, do not collaborate on future developments. In Ja by contrast, most of the big battery manufacturers, with the ex tion of Yuasa, also make electronic equipment. They include Sa Matsushita, Hitachi and Casio. Cooperation between division those companies has resulted in products -- such as watches calculators -- with integral lithium batteries.

Lithium's advantages are that it is the lightest metal, can w in sub-zero temperatures and is highly efficient -- lithium batt last up to five times as long as traditional ones. However, they cost up to 10 times as much to make and, as lithium is highly r tive, can be dangerous. Most lithium cells generate 3 volts, do the power of traditional batteries, and consequently the two t are not interchangeable. The United Kingdom Atomic En Authority Research Centre at Harwell have evolved a compact weight, rechargeable battery.

The Harwell battery: Instead of having electrodes in an trolyte, consists of three extremely thin layers, one on top a foil-coated plastic packets that keep potato crips crisper. The w battery is less than a quarter of a millimetre thick. The bulk o device such as it is, consists of the insulation needed to kee highly reactive electrode immolating itself in the surroundin

The electrolyte was the problem. The first work on solid batteries focussed on using lithium electrodes and various solid pounds made of lithium ions for the electrolyte. But these d give the ions sufficient passage and they tended to crumble battery was used. The trick was to use a plastic film with a li compound dissolved in it. The film proved good at carrying -- but not good enough. Making the film thinner helps, since it r the ions' journey shorter. But the most useful new developm an improvement in the mobility of the ions.

Plastics contain some areas in which all their molecules a ried ranks. In other places they are tangled and overlaping. In 'amorphous' areas ions can be move freely. The Harwell biggest step forward came when they found how to ensure that and more of the plastic film was in this amorphous form.

Because the battery is just a thin film, it can be rolled, and cut up like any piece of paper. The battery designer has choice about the size, shape, weight and power capacity of b tery. The film can be pasted around the inside of the case of able computer, or folded to fit inside the handset of a p telephone. The cellular telephones could be as handy as the set of an ordinary telephone. Because the new batteries are powerful than lead-acid batteries, weight for weight, they ma tually make electrical vehicles more powerful. Indeed the e conscious of the future may use the same batteries for the as for their earphones. -- T.P.S. R

CHEMARENA

S.L. VENKITESWARAN

Polystyrene — Tight Supplies

Polystyrene, one of the earlier thermoplastics before the advent of the polyethylenes continues to hold a third or fourth place in most countries. In India, it has always been at a far lower level than polyethylenes or PVC and in recent times moved up to the first position so far as price is concerned. Polystyrene is at a disadvantage in regard to raw materials as it needs both benzene and ethylene to make the monomer styrene. Both these have been in tight supplies in recent years and there are less prospects of a big jump in benzene supplies than for ethylene which can bank on a wide range of feedstocks including ethanol as in India. US sets the trend for polystyrene as for other plastics and the supply and price trends in USA set the pattern for the rest of the world.

Current growth in polystyrene demand in USA is 2 to 2.5% a year but is expected to fall in the near future. World demand growth is however set at an average of 4.6% between 1987 and 1993 after a rise of 6.7% in 1988 to a level of 16.4 billion lbs. and going upto 20 billion lbs. in 1993. World capacity is growing at 4.8% a year and may touch 27.6 billion lbs. The demand growth will largely be in the newer areas as indicated below.

Estimate for 1993

Asia/Pacific (includes India)	6.0	billion lbs.
North America	6.0	-do-
West Europe	5.0	-do-
East Europe	1.8	-do-
Africa/Middle East	0.6	-do-
Latin America	0.6	-do-

Prices have gone up to high levels in recent years to 60c/lbs. but tending towards 50 c/lb. now. Styrene prices have shown a trend to fall but benzene prices continue at a high level so that there are little prospects of any significant drop in price from the level of 50 cents/lb. for standard crystal grade. In USA, the high impact (rubber modified) grades account for over half of the demand.

Polystyrene costs more than polyethylene in many areas of packaging. There is much interpolymer compeetition in packaging but still a third of polystyrenes go for packaging including nonfoamed sheeting for cups, containers and caps. But foamed polystyrene has its special niche in packaging and is about 10% of total usage — trays for meat and produce, egg cartons, containers for processed food etc. But environmental concerns and the fire-susceptibility are problems yet to be tackled fully.

Building and construction accounts for another 10% mostly as insulation board. Appliances and consumer products take up perhaps 6 to 10% including ABS. Use in blends and alloys may continue to grow.

India is in a rather unhappy position with production linked to monomer production in 2 plants of about 15,000 tonnes per annum using ethyl alcohol as a source of ethylene. Another plant makes styrene for the SBR plant and also uses alcohol. There have been many proposals for new capacity but these have not made any headway and large quantities of both styrene and polystyrene are imported. The IPCL cracker complex was to have a styrene plant (by GSFC) but this was dropped. Synthetics and Chemicals have been planning a large capacity of styrene with half of this going for polystyrene but this is also not firmed up. Other proposals have been on the anvil but with little progress due to the need to tie up ethylene supplies.

There is now a better indigenous technology for ethyl benzene from ethyl alcohol without the need to generate ethylene — **the Encilite process of NCL** — thanks to the special catalyst developed by NCL. This process is already tried out in the Hindustan Polymers plant and proved the claims. The ethyl benzene plant is economic on smaller capacity levels of 10,000 TPA and a central dehydrogenation plant for styrene looks feasible. It is time for a detailed analysis and firm programme on these lines besides an equally large capacity linked to perhaps Haldia or Hazira cracker. The expected tightness in supplies for several years augurs well for 1,00,000 tpa of styrene/polystyrene in India.

Flue Gas Desulfurisation

The large coal-based electric power generation plants in USA have been obliged to tackle the emission of sulphur dioxide in the flue gases to comply with the recent regulations. While using coal of low sulphur content is an easier way, this option is not available for most of the units and therefore various alternate methods of desulphurisation of the fluegas — FGD — have been installed — 160 such units are said to be in operation. FGD only adds to the cost of generation of power unless the sulphur is recovered in a saleable form — sulphur or sulphuric acid. Most of these were installed between 1975 and 1986 in the wake of the Clean Air Act of 1970.

Now a new FGD process which results in a saleable grade of gypsum and a lower investment is to be tried out at one of the power plants under the Clear Coal Technology Demonstration Programme of the Department of Energy. The process termed Pure Air is a development of Air Products Chemicals, USA and Mitsubishi Heavy Industries of Jap. This process is also a wet limestone scrubbing process b under conditions and post process sequence (oxidation) wh leads to gypsum of commercial quality. The process is a cocurrent upward flow system of the limestone slurry a flue gases and with a module of larger capacity and reli ility so that no spare module is needed.

The unit under trial is for treating the gas from two bo ers for a total of 528 MW, burning coal of 3 to 4.5% sulp content. This yields 1,50,000 tonnes of gypsum per year. P Air will assume full responsibility and own the unit and op ate the scrubbing system after design and construction of same. It will guarantee performance over a period of ti The Department of Energy of USA is to provide $63.5 m lion out of a $150 million cost while the power company spend only $ 8.2 million. The market for such FGD unit USA is estimated at $ 10 billion in the Nineties.

Haldia Petrochemicals takes final shape

West Bengal has completed the Swayamvar of the candidates interested in teaming up as partners in the Haldia Petrochemicals Complex. Perhaps the Central Government had its own views on the marriageable age and let the West Bengal authority wait a dozen years before clearance and a full sixteen years may have lapsed after the initial conception before the first ton of product enters the market. The choice is finally on the Tatas with Tata Chemicals playing the major role with 25% of the equity of perhaps Rs. 800 crores in this Rs. 3000 crores plus complex. The Goenkas have been left out in the cold unless they get a slice of the downstream product spectrum. Tatas are certainly the best of the parties in view and besides financial and managerial resources Tata Chemicals have the expertise besides being the first major chemical venture in India (with soda ash). There is an arduous long way ahead with the reappraisal and approval by the IDBI and associate finance institutions. Fortunately there are few other projects in line, with IPCL and Reliance Group not in need of Institutional support and Gas Authority of India also capable of finding its own resources. The crucial questions will be one of the foreign exchange requirements and the final product spectrum. Haldia has for several years been on this exercise of revising products and capacities at the behest of the Government of India's experts and can no doubt come up with the appropriate products and capacities keeping in mind the current market situation expected projections from 1993-94 onwards.

There may be problems even for Tatas for getting thro with all that they have undertaken. The Gas-based fertil project of Rs. 765 crores may not suffer but there are l ering doubts about the refinery at Karnal (Rs. 1500 crore This refinery is also due for completion in 3 years but partner — Indian Oil Corporation — is flush with fund bridge any gaps. Tatas have several giant undertakings w could contribute in the three major projects requiring Rs. 5,000 crores investment in 3 years. Tatas have a f of public confidence to spur them on.

A question which arises is regarding the programmes w have been approved (and are said to be going ahead) on basis of imported ethylene or other intermediate during initial stages. The Finolex PVC project is one and even R ance Petrochemicals was on similar lines. There is need a lot of Vinyl Chloride Monomer in Tamilnadu and the Haldia could do would be to meet this requirement and e inate imports. The C4 are vital components of the nap cracker and besides butadiene, a programme for C7/C8 fine would be appropriate so that the present import of could also be eliminated.

What ails drugs retailing panel

The Bhatty Panel, appointed by the Government to study the economics of pharmaceutical retailing, is at a standstill with no reliable data to assess the issue, let alone make any recommendation says a **Financial Express** bureau despatch.

A committee headed by Dr. Z.A. Bhatty, Director of National Council of Applied Economic Research (NCAER) was appointed last year, following differences of opinion between the industry and the trade over what should be the reasonable trade margin for pharmaceutical wholesalers and retailers.

The Kelkar Committee, in its original report had advised the Government not to fix trade margins, and to leave it to the industry and trade to settle on their own. The Government had spurned the advice and fixed the margin, leading to complaints from the industry that it was on the higher side.

Later, the industry and the trade agreed on 16 per cent margin for retailers for price-controlled drugs (five to six per cent for wholesalers) and 20 per cent for decontrolled formulations (10 per cent for wholesalers).

This meant that more than 20 per cent Maximum Allowable Post Manufacturing Expenses (MAPE) allowed as per the 1987 Drug Prices Control Order (DPCO) went to the trade. Indeed, more than one study conducted by the industry has shown that trade rather than industry was the major beneficiary of the new DPCO.

This, the industry had complained, went against the avowed purpose of DPCO, which was to encourage the production of drugs by giving a better return to the producers. This was the genesis of the appointment of Bhatty Panel. With no data to study the issue, the committee decided to conduct a survey and prepared questionnaire for the purpose. The committee managed to collect some data when the All-India Organisation of Chemists and Druggists (AIOCD) sent a circular to all its constituents, asking them not to co-operate with the panel.

The data given to the panel are not only inaccurate, but hilarious. According to informed sources, chemists too who responded to the questionnaire appear to have deliberately given misleading information. If one were to believe this data, chemists are not only making money, but are paying their staff from their own pockets, a highly improbable situation. The panel members are unable to make any sense out of the data.

Nor is the industry is in a position to help as it has no access to data on rentals, storage, wages and the like incurred by chemists. Meanwhile, the issue of loan licence continues to hit headlines. Apprehensions that the practice will come to a stop after March 31 are misplaced. That loan licencing should be abolished by 1990 was only a statement of an intention in the drug policy of 1986.

The Government has not made any relevant change in statutes. A draft amendment had been circulated sometime ago, deleting the existing clauses pertaining to loan licence. Comments were elicited and all industry associations had pleaded for continuation of the system. Until an amendment deleting the provisions on loan licence is notified, the practice will continue.

A committee headed by Dr. P.K. Gupta, Drug Controller of India, had unanimously recommended to the Government that the system of loan licence be extended for a period of four years from 1990. Everyone is agreed that the system should be phased out rather than abruptly abolished.

It is estimated that nearly 60 per cent of the existing manufacturing capacity of small-scale units is being utilised loan licence manufacturers.

If abruptly abolished, it is bound result in industrial sickness and une ployment. The turnover of loan lic ces is said to be around Rs. 400 cror Reputed companies like Cadila Themis began as loan licence unit

Big as well as small units resor the loan licence system. Some in Government do not approve of big u farming out their products to the sm sector, whose costs are low, especi when there is no capacity restric except for multinationals.

They are also not happy with the liferation of loan licences in the sm scale sector on the ground that the GMP is now made statutory, no units are following the same. The He Ministry is also opposed to prepetua of the system because of this reaso has however, supported Dr. Gup recommendation that it be continued four years. If abolished all of a sud it is sure to lead to a shortage of es tial drugs.

INDUSTRIAL ALCOHOL LE TN TO FILE REVIEW PETIT

The Tamil Nadu Governme expected to file a review petition, jo with Uttar Pradesh, Maharashtra Karnataka, before the Supreme C against its recent ruling on the le industrial alcohol. Following the ju ment on October 25, the State Go ment had withdrawn the excise du vend fee on rectified spirit mea both the industrial chemical and use.

The total loss of revenue fro excise levy withdrawal is Rs. 25 per annum for the spirit allott IFMS. It comes to Rs. 3 crores fo strial chemicals. According to c sources the State Government st the right to levy excise duty on products.

ALCOHOL MANUFACTURE

States told to stop issue of new licences

The Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy, said that all efforts would be made to ensure that the full requirement of the chemical industry for industrial alcohol is met. The government, he said, would encourage export of value-added chemical products based on alcohol.

Addressing a meeting of the Central Molasses Board in New Delhi, Mr. Gurupadaswamy asked state governments not to issue any more licences for manufacture of alcohol and review the excise duties and other levies on industrial alcohol in line with the Supreme Court judgement.

The units, which have been issued licences under state government laws may also be directed to approach the Central government for the grant of carry-on business licences. Mr. Gurupadaswamy said that in a recent judgement, the Supreme Court had upheld the stand of the Union government that licences for setting up of distillery units could exclusively be granted by it. The Supreme Court also held that all duties or taxes on industrial alcohol could be levied by the Government of India alone.

The minister also requested the state governments to ensure that approved units did not exceed the production of potable alcohol beyond their licensed capacity and that action was taken in accordance with rules against defaulting units.

Mr. Gurupadaswamy said though the central government's policy had been to encourage the use of alcohol for industrial purposes, there had been an unchecked growth in the capacity for potable alcohol. In spite of the ban imposed on it by the Central government, some state governments h issued licences for setting up of n units under state excise laws.

The utilisation of alcohol for potal purposes went up from 343 milli litres in 1987-88 to 417 million litres 1988-89 — an increase of 21.578 j cent. The requirement for 1989-90 p jected by the states and union territ ies is 474 million litres, a furt increase of 13.67 per cent.

Expressing concern at this increase the use of alcohol for alcoholic drin Mr. Gurupadaswamy said prior should be to encourage alcohol-bas chemical industries.

Alcohol, he said, was an import raw material for downstream industr like acetic acid, acetaldehyde, and like. A number of products being m ufactured from the petrochemical ro could also be manufactured from alcohol route. The advantage in follo ing the alcohol route was that it i renewable source while petroleum p ducts were depleting, Mr. Gurupad wamy said.

The minister said that after an all-ti high production of 42 lakh tonnes molasses in 1987-88, production dur 1988-89 had been around 35.5 l tonnes — a decline of 6.5 lakh ton over the year. Production of alcohol h however, gone up from 636 mill litres in 1987-88 to 797 million litre 1988-89. This has been largely du better utilisation of distillation capac higher demand of the product in country and exports.

The minister requested state gove ments to recast their estimates ab demand and availability of alcohol molasses so that the interstate allo tions for the current year could planned on a realistic basis.

He said a working group had beer up under the secretary, departmen chemicals and petrochemicals, to l into various aspects of the problem effluent control in distilleries. Direct had been given for installing prim stage anaerobic treatment systems in distilleries in the country latest by December-end.

Phosphoric acid imports through MMTC

The Commerce Ministry has decided to canalise imports of phosphoric acid and ammonia through the Minerals and Metals Trading Corporation (MMTC). A notification to this effect is expected shortly.

The imports of phosphoric acid and ammonia, hitherto with the State Trading Corporation (STC), have been under a major controversy since August last year. In fact, a three-cornered battle among STC, MMTC and the Department of Fertilisers had emerged following the previous Government's desire to canalise imports of the two items.

The battle, however, ended in favour of STC which convinced the Government that imports through it would make up for its falling turnover. On October 6, the Commerce Ministry issued a notification canalising the imports through STC despite the Finance Ministry's strong desire to canalise it through MMTC.

The Commerce Ministry has now felt that MMTC can effectively balance the imports of ammonia, phosphoric acid and DAP. MMTC is already importing DAP. The country could in fact only import DAP which is made from phosphoric acid and ammonia.

However total dependence on DAP might result in unrealistic increase in international prices. Hence, a balance has to be created in imports of the three fertiliser products which could best be done under one umbrella, Udyog Bhavan sources point out.

STC on the other hand neither has the expertise nor facilities to handle fertiliser imports. The present Agriculture Minister, Mr. Devi Lal, has also given his assent for its imports through Minerals and Metals Trading Corporation unlike the former Minister, Mr. Bhajan Lal, who had wanted canalisation of imports through the Department of Fertilisers.

In fact, Mr. Bhajan Lal's Ministry had contracted for three lakh tonnes of phosphoric acid from Morocco in spite of the Government's notification canalising imports only through State Trading Corporation. The country imports about one million tonnes each of phosphoric acid and ammonia every year.

The largest supplier of the two is Morocco, followed by the US and Senegal. With canalisation of phosphoric acid and ammonia the turnover of Minerals and Metals Trading Corporation is expected to touch Rs. 7,000 crores with the two fresh items contributing to the extent of Rs. 2,000 crores.

Meanwhile, the industry has been facing shortage of phosphoric acid and ammonia following the previous Government's failure to resolve the issue. The Udyog Bhavan sources felt that with canalisation through MMTC, the crisis would be over forever. It is expected that imports would take place in time and prices could be bargained for better.

POLYMER PRICING: MAFATLAL GROUP REFUTES CHARGES OF ENGINEERING CUSTOM-DUTY HIKE

The Mafatlal Group has refuted a report appearing in a section of the press that it has engineered the recent increase in the customs duty on polymers and that as a result NOCIL & PIL have "a take-in estimated at Rs. 90-crores".

The Mafatlal Group further clarifies that neither NOCIL nor PIL have increased prices of PVC and HDPE respectively, consequent to the increase in the customs duty. Moreover, PIL has even advised the Government that in view of the recent increases in the CIF prices of HDPE, the customs duty increase was ill-timed.

SEMINAR

Advance in pesticides

The Technical Advance Centre (TAC) Madras in association with the SPIC, Science Foundation, sponsored a seminar on "Advance in Pesticides" on 7th, 8th and 9th February at Madras. Shri C. Subramaniam, Vice-President, Bhartiya Vidya Bhavan and Governor-designate Maharashtra, presided.

Welcoming the delegates, Dr. K.S. Rajagopalan, Executive Vice-President, TAC said that the current seminar was the 7th programme of the TAC to bring the manufacturers, R & D institutions and users together.

Shri G. Dwarakanathan, Executive Vice-President, SPIC in his presidential address observed that the SPIC Science Foundation was basically concerned with the development of science and technology. The Foundation had recently opened a school for mathematics and a computer centre. He observed that the results of the research done by the Science Foundation would be available to the entire industry. Talking of pesticides, he noted that world pesticides production was worth ten billion U.S. dollars, most of it consumed in highly developed countries like the U.S. and Japan. The cost of production of pesticides with low levels of toxicity is high — hence not many Indian companies go for them.

Shri C. Subramaniam inaugurated the seminar. He noted that development of new breed of seeds by genetic engineering has revolutionised agriculture. This has necessitated the usage of pesticides whose residues caused environmental problems, affecting humans and animals alike. New seeds had to be developed with in-built resistance to pests.

Smt. Latika D. Padalkar, Secretary Dept. of Agriculture Tamil Nadu Government, released a souvenir on the occasion, covering special articles, extended abstracts and detailed programme of the symposium. Dr. G. Rangaswami, former Vice-Chancellor, Tamil Nadu Agricultural University delivered a special address on "Pesticides and their Degradation". Shri J. Guruswami, Secretary, TAC proposed a vote of thanks.

The sessions of the symposium started on 7th February and ended on 9th February. The six sessions were presided over by eminent persons. Ten keynote addresses on various aspects of pesticides by experts and ten presentations by registered delegates were made during the six sessions.

Dr. Mukerjee gave an overview 'Pesticides Research — Retrospect Prospect', Dr. C.R. Krishnamurti d with impact on health and environm the art of pesticide formulation and s life problems were explained by Sushil Khetan, pesticide managem for increased agricultural producti were elucidated by Dr. Jayaraj, statu herbicides discussed by Professor A Lakshmanan, botanical control of p ticides discussed by Dr. Abdul Kare inhouse process development dealt v by Dr. Sivasankaran, weed contro sugarcane by Dr. Dharne, newer pe cide formulation by Dr. Panchatshar control release formulation by Dr. Rajagopalan and pesticides in susta bility of agriculture by Dr. Sankar

Mr. A.M. SRIKANTA IYER APPOINTED SEM

Mr. A.M. Srikanta Iyer, we known Plastics Consultant has be appointed as special Executive Ma istrate, by the Government of Mah rashtra, in recognition of h contribution to the industrial and bu iness community. Mr. Iyer has be rendering yeoman service to the pla tic industry for many years and also a Honorary Editor of Polul Plastics. CHEMICAL WEEKL congratulates him on his ne appointment and wishes him the ve best.

BICP fixes new price for paraxylene

The Bureau of Industrial Costs and Prices (BICP), has recommended a fair price of Rs. 9,852 per tonne for paraxylene to be produced by the public sector IPCL after its expansion to 45,600 tonnes per annum in March 1990.

"The estimated Long Range Marginal Cost (LRMC) price works out to Rs. 9,515 per tonne of paraxylene. This price provides, on an average over the life, around 24 per cent pre tax profit (12 per cent post tax) on initial equity assessed as 33 per cent of total investment. The xylene expansion project is not a complete grass root plant. In view of the above, an alternative estimate of normative price has been done on conventional method of cost for a block of first five years. The price works out to Rs. 9,852 per tonne."

Clearly, this is the price which IPCL should charge Bombay Dyeing when the expansion comes through. But the question is will it? IPCL's pricing on paraxylene and DMT has closely followed twin factors: Reliance pricing and landed cost of imports inclusive of import duty. In the process, Reliance sets the pace and there is none in the Government caring to look at actual facilities set up by the company and the costs involved. Inquiries with financial institutions show visits to Patalganga are few while the company refuses to part with any details to BICP.

By any yardstick, the paraxylene cost of Reliance Industries Ltd. cannot be beyond Rs. 12,000 per tonne, though it has charged up to Rs. 22,500 per tonne.

Currently, IPCL has at present an annual installed capacity of 17,000 tonnes of paraxylene, 21,000 tonnes of orthoxylene and 2,500 tonnes of mixed xylene. After expansion, the capacity of the plant would be 45,600 tonnes of paraxylene and 42,000 tonnes of o-xylene, the process know-how for pretreater unit is supplied by Akzo Chemie, of the Netherlands while for existing reformed by Cyanamid-Ketjen, Netherlands. The respective catalyst for the process will be supplied by them for paraxylene recovery. Paraex technology is supplied by UOP, of the US. The absorbent and desorbent required for the process will also be supplied by UOP. For isomerisation, it has been decided to go for indigenous xylofining process instead of MHTI process from Mobil as originally planned.

Numerous discussions with Government representatives have been held on demand-supply of paraxylene and Reliance Industries has been consistently promising 6,000 tonnes per annum without revealing its actual installed capacity and captive consumption figures. Nor are the cost figures revealed. It is surprising the company seems to have given details to the costing department of the Union Finance Ministry and shied off from BICP, which again comes under the same Ministry.

-- **Financial Express**

CHEMICAL INDUSTRIES ASSOCIATION WELCOMES WITHDRAWAL OF EXCISE DUTY AND VEND FEE ON VARIOUS KINDS OF SPIRIT

The Chemical Industries Association is happy that the Tamil Nadu Government has come out with a Government order, withdrawing the excise duty and vend fee on various kinds of spirit, in full conformity with the judgement of the Supreme Court on the subject dated 25.10.1989. The Association is particularly pleased that the Government in their wisdom have considered it advisable not to go on appeal or introduce other forms of taxes as U.P. and Maharashtra are contemplating.

In fact the Association tendered their advice to the Government in Oct. 1989 itself that it would be advisable to accept the Supreme Court directives in this matter. The deicision of the Tamil Na Government, though more delayed th that of Maharashtra, is very welco and will help the growth of distiller and alcohol-based chemical industr within the State. The present Ta Nadu Goverment has taken many st during the past one year to promot healthy climate for chemical industr and the present step no doubt is co mendable says the Association.

TN PLAN OUTLAY PEGGED A Rs. 1,450 CRORES

Tamil Nadu will have a plan out of Rs. 1,450 crores for 1990-91 agai the current year's figure of Rs. 1,3 crores. This was decided at a meet between Planning Commission Dep Chairman Mr. R.K. Hegde and ch minister Mr. M. Karunanidhi at N Delhi on February 5. In his introduct remarks, Mr. Hegde said the approa paper of the Eighth Plan, incorporat the new priorities, developmental stra gies and philosophy, was under prepa tion. According to him, the purpose the plan discussions with the states w not only to determine the size of th annual plans but also to consider t issues involved in the translation of t new priority programmes into reali

The meeting, he said, was an ex cise in free exchange of ideas betwe the chief ministers and the Plann Commission. Mr. Hegde said differ parts of the country could benefit fr each others' experience through su constant exchanges.

He said Tamil Nadu had set a go record of development in various fie and could make a significant contri tion in building up a common pool knowledge and experience. Mr. Karu nidhi referred to the schemes, particul ly those relating to electrification a water supply in rural areas, which h been successfully implemented by state. He said the state govt. would ma sustained efforts to implement progra mes in keeping with the new prioriti

Leather fair biggest ever

The India International Leather Fair ILF) will be held in Madras next year so. Announcing this, Mr. K.V. Rajan, hief General Manager, Trade Fair uthority of India (TFAI), told a press onference at Madras recently that the ecision followed the unprecedented iccess of the just-concluded fair in ladras.

Rajaji Hall was likely to be the venue or next year's fair also and the dates ould too remain the same, from Janary 31 to February 4. The fair this year as the biggest ever in terms of foreign nd Indian participants as also business isitors. About 20 business delegations om a number of countries had also vised the fair.

Mr. Rajan said the business results of he fair were estimated to exceed that f last year's. A survey among the paricipants of IILF 1989, who had come gain this year, revealed that over the ast 12 months, business that could be actually attributed to last year's fair was to the tune of Rs. 100 crores, of which roughly 50 per cent was on account of exports.

On the basis of a questionnaire circulated to the participants this year, it was also evident that about 90 per cent of them were in favour of repeat participation. It had also been revealed that a large variety of leather products received a highly encouraging response for export from India. As regards imports into India, it was found that machinery, particularly for tanning and footwear and garment-making, was the leading product category for which substantial transactions were reported. Import deals for hides and skins in wet blue, valued at about Rs. 60 crores, were being worked out.

As part of the fair, a computerised survey of the visitors was also conducted during the first three days. It indicated that of the more than 15,000 visitors during the business days, nine per cent had come from overseas and 41 per cent from outside Tamil Nadu. Professionwise, 58.5 per cent of the visitors were leather manufacturers, 37.4 per cent exporters, 10.9 per cent importers, 8 per cent wholesalers and 5.6 per cent retailers. Productwise, 43.4 per cent were interested in leather machinery, 27.9 per cent in leather manufacturers, 17.4 per cent in leather chemicals, 33.9% in leather accessories, and 9.5% in leather consultancy.

Mr. Mohammed Hashim, Chairman, Council for Leather Exports, said the three-fold aim of the fair — exhibition of the latest technology, bringing together various sources of raw material and, promotion of exports — had been largely fulfilled. Mr. Rajan and Mr. Hashim denied complaints that the rates for participation in this year's fair were very high. One had to pay more for participation in fairs abroad. Besides, the total revenue of the fair was much less than the expenditures incurred.

LEATHER GOODS STANDARDS

Links with EEC likely

A tie-up with European Economic Commission (EEC) for common standards in leather products is on the cards. The issue will come up at the working group meeting of the Indo-European agreement on industrial co-operation due in Delhi shortly. The meeting will focus on standardisation and testing of leather products.

The programme, however, will be concerned only with standards in leather software, according to Mr. S. Subrahmanyan, Additional Director General, Bureau of Indian Standards (BIS). Presiding over the National Conference on Standardisation and Technology Advancement in Leather Industry, Mr. Subrahmanyan spoke of the need for tackling the European market in the nineties. As it is, nearly 25 per cent of our leather exports are absorbed by Europe. At the same time 35 per cent of our imports are from there, he said.

A programme for harmonisation of standards is already in operation with the USSR. Delivering the keynote address, Mr. Sahasranaman, Executive Director, Council for Leather Exports (CLE), called for standardisation of leather industry to improve quality.

For this he suggested standardising inputs. Most important is the need for removing quality inconsistency. Further, stress should be given to developing the skills. Importing the latest equipment and providing adequate motivation will also help in this matter, he pointed out.

Speaking on the occasion, Mr. M.M. Hashim, Chairman, CLE, wanted BIS to standardise the chemicals and machinery in the leather industry to compete in the international market.

Welcoming the gathering, Mr. Rafeeque Ahmed, Chairman, Indian Finished Leather Manufacturers and Exporters Association, favoured a set of standards keeping consumer interest in mind. These standards should be periodically reviewed to keep pace with latest fashion trends, he said.

India is the only country in the world to use 60 per cent of cow and goat skins to make lining leather. In his opinion, this should be brought down to 40 per cent. For upgrading hides, low cost polyurethane based finishes could be supplied to small tanners, Mr. Ahmed observed.

In his inaugural address, Mr. N. Biswas, Deputy Director General, Directorate General of Technical Development (DGTD), assured the co-operation of DGTD in promoting the adoption of national standards in manufacturing and purchase programmes. He also promised assistance to BIS in this direction.

US READY TO ASSIST INDIAN LEATHER GOODS UNITS

The commercial consul, American consulate general, Madras Mr. Rajendra K. Dheer, said the Foreign Commercial Services (FCS) of the US government is ready to assist Indian leather goods manufacturers in their plans to associate themselves with their American counterparts.

The FCS could offer assistance to identify American supplies of shoe and garment making machinery and other facilities, he said and called upon the Indian entrepreneurs to make full use of the services of the American commercial staff in Madras.

Presiding over a seminar on Indo-US co-operation in the Indian leather industry's development, organised by the Council for Leather Exports (CLE) and the Indo-American Chamber of Commerce, Mr. Dheer said the trade and development programme (TDP) of the FCS was available for Indian[s to] share the experience of US consult[ants] and capital goods suppliers.

The common effluent disposal u[nit] proposed to be set up at Ambur in Ta[mil] Nadu's North Arcot - Ambedkar dis[trict] by a group of tanners could avai[l] grant under the TDP for feasibilit[y] pre-feasibility studies, he said.

Mr. Dheer said with both Central [and] state authorities strictly enforcing p[ol]lution control laws, the Indian lea[ther] industry had to respond to the prob[lem] by drawing upon the US manufac[tur]ers' experience in dealing with it.

He suggested that the Indian ind[us]try associate itself with the Lea[ther] Industries of America (LIA) to pro[duce] quality products for American mark[et]. LIA would also come in handy [for] India's import of finished leather [to] enable the country achieve its ex[port] target of $2,400 million by 1994-[95].

The CLE Chairman, Mr. M[.M.] Hashim, suggested a bilateral assista[nce] programme for leather between In[dia] and USA. He regretted that even [as] American imports from Taiwan [and] South Korea were decreasing, Ameri[can] manufacturers were looking to Thail[and] and Indonesia instead of coming [to] India, which had liberalised its ex[port] and import policy to a large exten[t].

METHANOL IMPORT UNDER OGL URGED

The Chemical Industries Associa[tion] has urged upon the Government of In[dia] to maintain import of methanol un[der] OGL at least for the next three ye[ars]. It has also sought Finance Minist[ry] nod for reduced import duty at the le[vel] fixed during 1987-88.

The country's total installed capa[city] is about 131,000 tonnes shared by [ ] units — two in Maharashtra, one e[ach] in Gujarat and UP and a small plan[t in] Assam.

Support for small leather exporters

The small and medium leather exporters' will receive considerable backing under the intensified market development project. The project, set up under a World Bank scheme, provides for grant to the extent of 50 per cent for specified expenditure on promotional efforts. The applicants must present a detailed report indicating their inputs and marketing strategies.

The scheme is being implemented through the Exim Bank, Canara Bank, Bank of Baroda and ICICI. Disclosing this at a seminar on 'Indo-German co-operation in development of Indian leather industry', Mr. A. Sahasranaman, Executive Director, Council for Leather Exports (CLE), stressed the need for close co-ordination between Indian leather exporters and the buyers in Germany.

He noted that as a part of active marketing strategy, the Indo-German export project in Delhi will assist medium level exporters from India to sell directly to independent importers in Germany. West Germany is the largest importer of leather garments, he pointed out. He also felt a need for upgrading the existing facilities to satisfy the quality conscious market in West Germany.

Speaking on the occasion, Mr. M.M. Hashim, Chairman, CLE, said the leather exporting sector in India is planning workshops in Germany. Indian leather products will be on display at selected department stores. Media support is also on the anvil. In 1988-89 India exported leather garments worth Rs. 300 crores. Of this, West Germany accounted for Rs. 60 crores. Mr. Hashim mentioned that the export proceeds of leather footwear went up from Rs. 3.5 crores in 1984-85 to Rs. 33 crores in 1988-89, those of shoe uppers jumped from Rs. 11 crores to Rs. 520 crores during the same period, he said.

Last year exports by small scale industries fetched Rs. 47 crores. Mr. Hashim wanted the industry to pay more attention to quality keeping in mind the need for a good brand image. For this, he favoured giving training to Indian manufacturers in institutes in Germany.

LEATHER CHEMICALS FROM GERMAN FIRM ON DISPLAY

SM Zschimmer and Schwarz Chemicals Ltd., a joint venture company of SM Dyechem and Zschimmer & Schwarz Chemicals, West Germany, participated in the International Leather Fair, held at Madras recently.

SM Zschimmer & Schwarz Chemicals, with its plant at Pune, manufactures a wide range of chemicals for the leather industry, including fat liquors and synthetic tanning agents. SM Dyechem, the joint venture partner, markets the chemicals manufactured and, in addition, offers the leather industry a comprehensive range of resin binders.

Besides the display of the products manufactured, SM Zschimmer & Schwarz Chemicals also displayed leather processed with its chemicals.

A COURSE ON CORROSION

ESCI (Engineering Staff College of India, Hyderabad instituted by the Instution of Engineers) is conducting a three-day course on "Corrosion in Industrial Installations & R.C.C. Structures" from 16-18 February, 1990 at the Garware Institute of Career Education, University of Bombay, Kalina Campus, Santacruz (East), Bombay 400 098.

Fees per participant is Rs. 1,050. The cheques/D.D. may be drawn in favour of "The Institution of Engineers (India), Engineering Staff College of India" and can be sent to Dr. H.T. Lokhande, Hon. Programme Advisor to ESCI, Department of Chemical Technology, University of Bombay, Matunga, Bombay 400 019. (Tel. No.: 4114302 to 07).

Import duty on plastics to be cut

A reduction in the import duty on plastics, which was hiked on January 5, is on the cards, says a despatch from the **Economic Times**. According to official sources, the recent spurt in international prices of plastics has made the duty reduction inevitable. The question now is whether the duty should be reduced immediately or through the budget which is to be presented to Parliament next month.

The international prices of plastics have fluctuated widely during the last two years. Prices of low density polyethylene (LDPE) were somewhere around \$500-550 per tonne in the middle of 1987. These prices went up to \$1,300-1,375 a tonne in March 1988 and started showing a downward trend thereafter. By October 1989 LDPE prices had come down to \$710-730 per tonne. Thereafter, they started climbing up again.

Similarly, prices of polyvinyl chloride (PVC), which were around \$500-600 per tonne in 1987, went up to \$1,000 to 1,100 per tonne in March but came down to \$550-650 in October 1989. Prices of other plastics in the international market are now showing an upward trend.

The duty increase last month, followed by an increase in international prices, has resulted in the landed prices of imported products being substantially higher than the domestic cost. It has also resulted in several importers making a kill on the imports made by them at lower prices before the duty hike came. These products are now being disposed off at the new landed prices.

The estimated demand for plastics in the country during the current financial year is estimated at about seven lakh tonnes. The domestic production is put at 3.40 lakh tonnes while the rest of the demand of 3.60 lakh tonnes is to be met from imports. The demand for LDPE and LLDPE is estimated at 1.80 lakh tonnes. Half of this is to be met from imports and half from domestic production.

HDPE demand is estimated at 1.40 lakh tonnes, its domestic production at 40,000 tonnes and imports at one lakh tonnes. The demand for PVC is estimated at 2.50 lakh tonnes. Of this 1.35 lakh tonnes is to be met from domestic production and 1.15 lakh tonnes from imports.

The rest of the demand consists of polypropylene and polystyrene. The demand for polypropylene is put at 85,000 tonnes, its domestic production at 50,000 tonnes and imports at 35,000 tonnes. The demand for polystyrene is put at 45,000 tonnes, domestic production at 25,000 tonnes and imports at 20,000 tonnes.

According to Petroleum and Chemicals Ministry, price fluctuations in the international market have affected the domestic processing industry particularly because most of it is in the small scale sector. The plastics processing industry primarily consists of small scale units numbering 15,000. About 70 per cent of the plastic processors consume one tonne or less of plastics.

CHEMISTS FIND THE IDEAL SOLVENT

A chemically inert gas, that makes up only about a millionth of a per cent of the Earth's atmosphere, is surprising chemists.

Martyn Poliakoff and Michael Healey of Nottingham University are using xenon as a solvent for analysis and for chemical reactions at room temperature. This is around 120 degrees above its normal boiling point. In the early 1980s, Poliakoff and another colleague at Nottingham University used xenon as a solvent — but for reactions at low temperature.

Using the new solvent, they have ar lysed the tar-like deposits which fo when coal and oil are burnt. They a able to separate the tar into its comp nents and identify tiny traces of po cyclic hydrocarbons by analysing t characteristic pattern of the infrar light that they emit.

Xenon is the ideal solvent for bo chromatography and infrared spectr scopy because it is chemically inert a so cannot interefere with the compoun it is separating. Also, it cannot black o any part of the infrared spectru because it has no chemical bonds absorb this kind of radiation.

Poliakoff's group has also us supercritical xenon as a solvent f chemical reaction. This has enabl them to make new, and unexpecte stable, metal complexes of hydrogen nitrogen gas.

Meanwhile, German chemists ha obtained structural details of an orga xenon molecule. In 1967 Neil Bartl showed that xenon was not the tota inert element that chemical theo demanded. Using fluorine gas, the m reactive of all chemicals, he made co pounds such as XeF_2, XeF_4, XeF_6 a the oxofluoride, $XeOF_4$.

According to current theory the compounds are possible because o fluorine — and oxygen — have a stro enough attraction for electrons to bre into the perfect shell of electrons wh surrounds xenon and every other no gas. Of the noble gases, helium, ne and argon still resist all attempts make chemical bonds. Krypton a xenon will react, however.

Over the years, chemists have tri to attach other elements to xenon, b they have succeeded with very few them. The ultimate aim in this work h been to form a bond with carbon, a so make the first organic xenon co pound.

— The Hin

LOAN LICENCE SYSTEM IN DRUGS, PHARMACEUTICALS INDUSTRY

Government decision awaited

Over 8,000 loan licence manufacturers in drugs and pharmaceuticals industry are passing sleepless nights because of the uncertainty that is hanging over their future.

A Damocles sword is hanging over these units providing direct and indirect employment to around three lakh people. The time for the expiry of the system by March 1990 as proposed under new drug policy of 1986 is fast approaching and the government has not yet announced further extension of the scheme as has been unanimously recommended by an official committee appointed by the authorities to study the manufacturers' demand for the continuation of the system.

The committee was headed by the Drugs Controller of India and consisted of the drugs commissioners from various states as well as representatives of important industry associations and other technical persons from various government departments. After discussing the issue threadbare and long deliberations, the committee at its meeting held on April 7, 1989 had decided to recommend an extension for a further period of four years to the present loan licencee manufacturers, but still the government decision on it is awaited.

The loan licence system in drugs and pharmaceuticals industry's existence in the country has a history of more than 40 years. It also exists in other developed countries including the UK, USA, West Germany and Japan. Under the circumstances, the decision to abolish the loan licence system by March 1990 came as a bolt from the blue to over 8,000 loan licence units, 85 per cent of which are in the hands of self-employed technocrats like marketing professionals and production experts.

The system further provides a protective umbrella to a new entrant to the pharmaceuticals industry. He does not have to carry heavy financial overheads, since a loan licence, can manufacture the products without actually putting up a plant. After the initial few years, when the loan licence company becomes economically sound, it can put up its own manufacturing unit.

Even for the principal manufacturer who undertakes such loan licence work of several parties, it enables him to utilise spare capacity and generate return on the investment. Such a manufacturer, in most cases is an SSI unit. In fact, a fair number of the large pharmaceutical companies we see today started as loan licence units.

The unique feature of the system in the pharmaceutical industry is that the loan licence is considered as a separate entity. The drug manufacturing licences are issued by the appropriate authority in the name of the loan licencee and he is responsible for the quality of the products even though the same may have been manufactured in the unit of another person.

Under the new drug policy, good manufacturing practices (GMP) have now become statutory, so there is no reason that a principal manufacturer, following the GMP, would turn out inferior quality product just for a loan licencee.

The industry is hopeful that the government would soon announce its decision to extend the system till December 1993 and clear the clouds of prevailing uncertainties.

The turnover of such loan licence units is estimated around Rs. 400 crores and in the case of turning down the request of small units for extension of the system, the existing large companies would stand to gain to that extent.

IPCL's vaccine project cost escalates

The cost escalation has cast clouds of uncertainty over Indian Petrochemicals Corporation's project to manufacture injectible polio vaccine in collaboration with Institute Merieux of France. This project is aimed at translating the goal of total immunisation, one of the technology missions, into a reality.

A company styled Indian Vaccines Corporation Ltd. (IVCL) with equity participation by IPCL and the French Institute was proposed for large-scale manufacture of vaccines against measles, polio and rabies. Land for the project has already been acquired in Gurgaon, Haryana.

The Indian public sector partner should have been Indian Drugs and Pharmaceuticals Ltd. (IDPL) rather than IPCl as the former is engaged in pharmaceuticals and the latter is exclusively in the manufacture of petrochemicals. But the fact that IDPL was a loss-making unit and IPCL a well-managed, profit-making enterprise tilted the scale. There have been reports that IPCL was not keen on the project, though its management denies it.

The public sector came on the scene after the private sector shied away from it. Ajay Kanoria of Bhagalpur Cement was to have been the original collaborator with Institute Merieux, but later pulled out. The Projects Approval Board has okayed the project, estimated at that time to cost Rs. 85 crores.

ICICI, as the lead funding institution, had agreed to assist the project. The cost estimates have now been doubled — latest estimate says the cost will be in the region of Rs. 165 crores to Rs. 200 crores. ICICI has now asked IPCL to get a fresh PIB clearance for the revised cost estimate.

The project is in the national interest as it would have made the country self-sufficient in several vaccines which are now totally imported. Adequate vaccine availability supported by infrastructure and field force would have helped erase the scourge of polio which is widely prevalent in the country. Today, imported oral vaccine is preferred because of ease of administration and patient compliance. However, oral vaccine has to be preserved in deep freeze.

Vaccines are not under price control, but nor can the high cost of vaccine born of escalated project cost, be passed on to the patient. In other words, the subsidy burden on the part of Government will increase. Another problem from the point of funding institution is recovery of its loans. Because of these problems, the project is unfortunately getting delayed and one does not know what the future has in store.

The project is part of an Indo-French medical research agreement between the Indian Council of Medical Research and INSERM, the French Medical Research Institute, launched as part of the Festival of France last year. The Indo-French agreement covers seven areas — fertility and human reproduction, ophthalmology, nutrition, public health epidomology, virology, immunology and bioengineering.

IMPRESSIVE RISE IN CHEMICALS, DRUGS EXPORTS

Exports of basic chemicals, pharmaceuticals, cosmetics etc. have reached Rs. 1,317.6 crores during the first nine months of the current year (April-December), recording a sharp increase of Rs. 75.1 per cent over the exports of Rs. 752.7 crores effected during the corresponding period last year.

Though the export performance is remarkable during 1989-91, it is still 21.9 per cent lower when compared with the pro-rata export target of Rs. 1,687 crores for the nine-month period. The annual target for the current year has been revised upward to Rs. 2,250 crores against an actua exports of Rs. 1,247.8 crores durin 1988-89 and a target of Rs. 1,200 crore set for that year.

Exports of basic drugs and finishe formulations have gone up to Rs. 397. crores in the first nine months of the cu rent year, recording 68.6 per ce increase over the achievements c Rs. 235.5 crores during the correspon ing period of the last year. The cast oil exports during the same period ha virtually jumped to Rs. 113.5 per ce against Rs. 35.7 crores, an increase 217.9 per cent.

In the case of dyes and its interm diates, the exports have gone up by 60 per cent to Rs. 361.1 crores fro Rs. 225.6 crores and those of inorgan organic and agrochemicals are up 39.7 per cent to Rs. 121.3 crores agai Rs. 86.8 crores. Here, it is significant note that while exports of inorga chemicals have declined from Rs. 3 crores to Rs. 27.5 crores those organic chemicals from Rs. 31.5 cro to Rs. 64.4 crores.

Exports of cosmetics and toilet have gone up from Rs. 47.2 crores Rs. 36.9 crores, those of soaps fr Rs. 6.7 crores to Rs. 42.3 crores, s thetic detergents from just Rs. 32 la to Rs. 40.8 crores and perfumes fr Rs. 27.9 crores to Rs. 28.2 crores. agarbattis exports were better at Rs. crores as compared to Rs. 8.2 cro

Crude drugs exports have accoun for Rs. 59.8 crores against Rs. 47 cr for the same period last year, record an increase of 27.2 per cent. It incl exports of opium worth Rs. 16.6 cr against Rs. 8.7 crores during the s period of the last year and psyllium h Rs. 32.5 crores against Rs. 31.2 cr Exports of various essential amounted to Rs. 20.3 crores ag Rs. 12.3 crores, which include le grass oil Rs. 4.2 crores, sandalwo Rs. 3.9 crores, jasmine and tube concrete Rs. 2 crores.

How to check drug prices

As the National Front had said in its election manifesto that it would review the 1986 drug policy, the Union Minister for Petroleum and Chemicals, Mr. M.S. Gurupadaswamy, is naturally taking steps to fulfill the commitment. Pending a review of the policy, he has ruled out price revision. Whatever else may be said about the policy, there is no denying that it has encouraged production, marginally improved profitability and enabled the industry to emerge as a net earner of foreign exchange.

The task for the industry, is however, still unfinished. The industry is likely to miss the Seventh Plan production targets for bulk drugs and formulations by a wide margin. Moreover, the industry's profitability is still not high enough to induce financial institutions to increase their involvement in financing capacity creation or expansion. Even as the industry is concerned at these issues, Mr. Gurupadaswamy says that the Government cannot raise prices beyond a limit as it has to protect the consumers. It needs to be stressed that prices can be controlled without affecting availability of drugs if production costs are contained and there is a free play of the forces of demand and supply.

Regrettably, Mr. Gurupadaswamy expressed his inability to check the rise in the prices of essential inputs. In fact taxes add much more to drug prices than industry profits. So long as price revision is based on cost revision it will be irrational to arbitrarily limit the price rise in the name of consumer protection.

The Government's refusal to sanction a price rise in the face of cost escalation will benefit consumers. This benefit will, however, be purely temporary as the industry will lose interest in producing drugs whose prices are unremunerative, and there will be shortages. The Government ought to bear in mind that drug users are more concerned about supply than about prices. In any case, whatever may be the priorities of the Government and consumers, producers are unlikely to intensify their efforts to raise production of those drugs whose prices are unremunerative, if past experience is anything to go by.

As the Government is genuinely interested in protecting consumers without hurting producers, it will do well to significantly lower the burden of taxes and duties on the industry. Broadly speaking, these levies account for about one-third of drug prices. The Union Government had advised State Governments to exempt drugs from the turnover tax and other local taxes as drug prices are controlled. Unfortunately, the advice fell on deaf ears.

Like State Governments, the Union Government too is reluctant to sacrifice revenue yielded by imposts on the industry. The only hope for consumers is that small units with their relatively low overheads will supply drugs at prices lower than even those fixed by the Government. But apart from the fact that such supply is severely limited, its quality, as Mr. Gurupadaswamy himself indicated, cannot be taken for granted.

There are no short-cuts to the goal of adequate supply of drugs with high standards of quality and safety at affordable prices as the Government is unable to control production costs and unwilling to sacrifice its tax revenue.

— Financial Express

PROF. PAINTAL

Prof. A.S. Paintal, Director-General of the Indian Council of Medical Research (ICMR), has been given an extension for two years till September 1991. Prof. Paintal, whose term expired in 1989, was granted the extension by the President on the recommendation of the governing body of ICMR, said a spokesman.

BULK DRUGS

IDPL assures availability

Recently a meeting of the representatives of the Indian Drug Manufacturers Association (IDMA), the North India Small Scale Drug Manufacturers' Association and the main producers of tetracycline, oxytetracycline, vit. B1, B2 and erythromycin stearate was held under the Chairmanship of Shri Shyam Suri, Joint Secretary, Ministry of Petroleum & Chemicals to discuss the problems faced by them in the supply and availability of the above items.

In his introductory remarks, the Chairman detailed the reasons that prompted the Department to call the meeting. The North India Small Scale Drug Manufacturers' Association had represented the various problems faced by them, which included inter-alia the non-availability of certain items of bulk drugs used as raw materials by the formulators. On the other hand, for tetracycline, IDPL had indicated that they had abundant availability and inventory of stocks which were not being lifted.

The meeting of the representatives of both the producers of the bulk drugs and their users was therefore convened to iron out the problems faced by them in the supply and availability of these bulk drugs. The Chairman also stressed the fact that while request for imports of bulk drugs would be considered sympathetically where the need arose, it was necessary to exhaust all indigenous sources of supply, before import was considered, to protect the indigenous drug industry as well as to save precious foreign exchange.

At the request of the Chairman, IDPL gave a brief resume regarding the production, supply and demand for tetracycline HCl in the last year. CMD, IDPL indicated that there was more th sufficient stock of this item availab with them to meet the demands for th product. At present IDPL has 12.9 M of tetracycline HCl and they a presently in a position to produce ev more of the product on demand.

They are also holding an imp licence. He indicated that IDPL was a position to fulfill any order backed an L/c or demand draft. Representativ of the Small Scale Sector gave insta ces in the past when their orders for te racycline HCl had not been fu discharged by IDPL. These includ references received from Comet Ph maceuticals, Ahmedabad, D.C.I. Ph maceuticals, Goa and Radicura. T CMD, IDPL indicated the position respect of these orders according to t information available with him.

Mediating in the discussion, t Chairman observed that the proble seemed to be not so much in the no availability of tetracycline with IDP as in a certain lack of communicati between the company and the users. enquired with Synbiotics and Pfiz about their production and supply of t racycline and oxytetracycline resp tively. Synbiotics indicated that th produce about 8 MT of tetracycli every month, 50% of which is bei supplied to non associated formulato on the basis of orders received d backed by cheques or bank drafts.

Both Pfizer and Synbiotics stated t they were not under any strain to e cute the orders placed with them, th are able to supply to all the orders have no problem of inventories. Ph machem, producer of erythromy stearate indicated that stocks of this b drug were available below the DP price. In the case of vit. B1, Direc (Production), IDPL stated that th were likely to be some problems in production of this bulk drug due to linkage with production of sulpha dr and the difficulties in the availabili chlorosulphonic acid.

The Chairman suggested that indi-ual cases of non supply of bulk drugs ich had been referred to by IDMA d the North India Small Scale Drug anufacturers' Association during the cussions, should be taken up with PL separately.

However for the future it was pro-sed that the following steps would rve as guidelines in the supply of bulk ugs by IDPL, namely (1) any order for lk drug would be duly backed by an c or a bank draft. (2) orders thus ceived would be honoured within 60 ys of receipt till December 1989. For ders received from 1st January 1990 wards, attempt should be made to ecute them within 45 days of its ceipt and IDPL should organise their ocks accordingly. (3) in drugs, where ortages are being experienced, nor-ally, no order should be for more than unit's requirement for 3 months. If a nit's requirement is enhanced so as to lfil an institutional order etc., the rea-ons should be clearly indicated. (4) pply of bulk drug would not be denied n the basis of past lifting and no rea-ons would be asked for orders up to 00 kg. IDPL agreed to these guidelines.

Other companies also said that they ould not have any problem and they re already fulfilling all orders backed y an L/c or D.D. The chairman spe-ially stressed the need to place orders ell in time to enable to producers of he bulk drugs to plan out their produc-ion scheduled accordingly.

It was also decided that the above rocedures would serve as broad gui-lelines for the supply of all the bulk lrugs under discussion. On this part, Government would ensure that no short-all is caused in the domestic market by aking timely steps to even import the bulk drug, where it is found to be imper-ative in keeping with the Government policy on the subject.

In the course of the discussion, among the individual cases that were discussed, was the problem presented by the East India Pharmaceutical Company which was caused by the closing down of the Calcutta depot of IDPL. After listening to the facts of the case, the Chairman suggested that in view of the fact that the company was a customer of IDPL over the years, IDPL could consider whether in the interest of good customer relations, the problem could be sorted out by accepting their past payment and by taking a legal undertaking to be given by the company. The CMD, IDPL agreed to consider the suggestion.

In addition to the items on the agenda the Chairman also initiated a discussion on the manufacture of I.V. solutions. He requested the representatives of the industry for their views on how best the quality of I.V. solutions can be ensured. Various view points were expressed out of which the following facts and suggestions emerged:

(a) The manufacture of I.V. solutions using the latest technology and automatic bottle pack machines and sterilisers would not perhaps be possible in the small scale sector since the cost of the machines alone would exceed the permissible investment in the small scale sector.

(b) It would be considered whether BICP can fix a floor price for this item. If any tender is found to be less than 10% of the floor price, the tender should be rejected.

(c) Entry by organised sector should be encouraged in this field and they may be asked to give their problems and suggestions.

Members of the industry brought to the notice of the Chairman that the price of chloramphenicol requires to be reviewed. This need has arisen due to the enhancement of the exchange rate of the dollar. The chairman said this would be examined quickly.

RPS for fertilisers to be relaxed

The Government has broadly agreed to relax the retention price scheme (RPS) for fertilisers. A crucial meeting of the Fertiliser Industry Co-ordination Committee (FICC) on February 12 will be used as the sounding board by the Fertilisers Ministry to explain the proposal.

Reports are the Fertilisers Ministry has worked out a higher depreciation rate of 6.5 per cent spread over 15 years against the current norm of 5 per cent over 20 years. Earlier, the fertiliser industry was allowed a depreciation of 10 per cent extended over 10 years. This proposal surfaced in December and has now taken a concrete shape.

The Ministry has refused to relax capacity utilisation norms set up with ammonia based gas plants having to fulfil 80 per cent capacity utilisation in the first year, going up to 90 per cent between the second and 10th year and dropping to 85 per cent in the future. For non-gas based projects, the capacity utilisation norms will be 80 per cent, 85 per cent and 80 per cent respectively.

Financial institutions and industry are aware of the developments as they have been trying to force the pace with new fertiliser units based on HBJ gas are running into losses. The two public sector units and Indo Gulf Fertilisers of Mr. Aditya Birla have not been doing well while others keen on entering the field have been slow. The Chambal Fertilisers plant of Mr. K.K. Birla, the Tata Fertiliser unit and Oswal's Shahjehanpur plants will welcome the change though they still contend it is not enough.

RPS was tightened following the heavy outgo on subsidies to fertiliser units. In 1988-89, total fertiliser subsidy worked out to Rs. 3,250 crores and this is bound to go up under the new dispensation, which industry circles is certain to come. The Government apparently is not keen on raising fertiliser prices to farmers as it could affect their popularity. On the other hand they are against higher imports of fertilisers and the best option is to subsidise fertiliser units.

FI's are more bothered of their returns on investments especially after Mr. Aditya Birla telling them Indo-Gulf Fertilisers cannot pay interest on loans taken. In fact, Indo-Gulf Fertilisers' public issue was rescued by FI's.

Reports are Mr. Devi Lal and other important Ministers are keen on a new RPS giving added impetus to the Ministry. The alacrity of the Government to help fertilisers is in sharp contrast to the difficult controls placed on the drug industry. Surprisingly, the Government is not prepared to treat vital industries on par.

SUMITRA PHARMA

Sumitra Pharmaceuticals and Chemicals Ltd. (SPCL), which entered the capital market in August last for producing bulk drugs, has commissioned its plant and water charging units successfully in the sophisticated plant near Hyderabad.

Built and commissioned in record time, SPCL's bulk drug plant incorporates some of the latest improvements including swing-plant technology, high degree of automation, superior process, and GMP requirement for the US Food and Drug Administration approval.

After the recent marketing tieups with a US company and European firms and successful commissioning of the plant with water charging, the company is now on its way to commercial production.

HUMAN GENES FOR PLANTS

Scientists are inserting human genes into plants and turning the plants into miniature factories than can produce large quantities of useful human proteins. They have grown tobacco plants that produce antibodies; potatoes that can make serum albumin, a human blood protein widely used in surgery; and rape plants that make enkephalin, a painkiller producer in the human brain.

Announcements

A TRAINING PROGRAMME ON QUALITY CONTROL OF PESTICIDES

A training programme on Quality Control of Pesticides is to be held on February 26 — March 9, 1990 at Pesticide Development Centre, Udyog Vihar, Gurgaon-122016, Haryana.

The fees for the programme will be Rs. 3500/- per nomination (Rs. 3,150/- for Associate Members) inclusive of tion, course material, lunch and and evening tea/coffee, to and fro transportation from Dhaula Kuan, New Delhi to PDC, Gurgaon, one site seeing tour.

Course content is as follows:

* Raw material specifications for pesticide formulations
* Shelf-life
* Chemical analysis
* Specuroscopic analysis
* GC and HPLC analysis
* Hands-on training on instruments
* Biological efficacy of pesticides

Registration fee to be sent by Demand Draft in favour of 'Pesticide Development Centre', payable at Gurgaon. The last date for nomination is 17th February, 1990.

Dr. S.Y. KAMAT ELECTED TO SOCIETY OF DYERS & COLOURISTS

The Society of Dyers and Colourists, U.K. in their Council Meeting in January 1990, unanimously elected Dr. S.Y. Kamat as a Fellow of the Society.

Dr. S.Y. Kamat

Dr. S.Y. Kamat, after completing M.Sc. Tech. from the Department of Chemical Technology at Bombay proceeded to the University of Leeds for higher studies. In 1981 he received a Doctorate from the Department of Textile Industries, U.K. for his research in Dyeing of Polyester. On returning to India he was attached to BTRA as a pool officer in their Technical Service Department. He left BTRA and joined Sandoz (India) Ltd. as a Technical Executive in the Chemical Division in Bombay, where he is at present the Technical Promotion Manager. Dr. S.Y. Kamat is also the Editor of Colour Chronicle, a technical quarterly journal with wide circulation. He has published numerous papers and also presented quite a few of Seminars in India and the U.K. He has represented on sub-committees for disperse dyes and textile chemicals of the Bureau of Indian Standards.

For three years he was also a member of the Textile Division Council of the Bureau of Indian Standards, New Delhi. He is also an examiner for graduates and post-graduate students of the University of Bombay and the M.S. University of Baroda. Dr. S.Y. Kamat is a member of the Board of Textile Studies of the SNDT Womans' University, Bombay.

US BANK OFFICIALS VISIT GNFC

A 3-member team of the American Express Bank, led by Mr. Robert Savage, president and the chief executive officer of the bank, visited GNFC at Bharuch, Gujarat recently. Besides taking a keen interest in the working of various plants, they also visited the Rs. 75 cr. methanol project under implementation and the Rs. 237 cr. nitro-phosphate project nearing completion.

Gujarat Ambuja gets takeover offer

Gujarat Ambuja Cements Ltd. has eceived an offer from Coromandel Fer-ilisers Ltd. to take over its one million onne cement plant at Cuddapah district n Andhra Pradesh.

At a board meeting, Coromandel Fertilisers took the decision formally to lisinvest its cement plant, which was set up at a cost of Rs. 88 crores. Accordingly, it instructed its merchant bankers to scout for a viable buyer and there are indications that the bankers are likely to zero in on Gujarat Ambuja by virtue of their track record.

A top official of Gujarat Ambuja, Bombay, though confirmed having eceived the offer, however, declined to liscuss the prospects of it for obvious easons. Gujarat Ambuja, which has been planning to expand its cement capacity, is also inclined to the idea of aking over Coromandel's cement plant.

Further, Krupp Polysius AG, West Germany, being the main plant supplier o both the companies, Gujarat Ambuja will find it easier to operate the Cormandel cement plant. Besides, this plant with a largest annual production capacity of one million tonnes, has the latest ophisticated equipment required for ement manufacture like roller mills, -stage suspension preheataer kiln.

The plant, which provides employment to over 900, is financed by financial institutions and commercial banks ed by the Industrial Development Bank f India (IDBI) and the Interntional inance Corporation, Washington, to e extent of rupees fifty nine crores and he remaining rupees twenty nine crores re met through the internal sources and romoters contribution.

Coromandel Fertilisers was promoted y three companies, Chevron Chemial Company, California, International Minerals and Chemical Corporation, llinois, and the Madras-based EID-arry (India) Ltd.

SM DYECHEM JOINS PRAJ

SM Dyechem Ltd. (SMDL) has entered into an agreement with the Pune-based Praj Counseltech Pvt. Ltd. (PCL) to identify and execute modernisation of distilleries on a turn-key basis. This was announced by Shri.V.P. Ashar, vice-president of SMDL.

The finance which will be made available to sugar factories on soft terms will be adjusted against the purchase of industrial alcohol under a buy-back agreement to be concluded by SM Glycols, a division of SMDL, which is setting up a Rs. 274-crore project at Bhare village in Mulshi Taluka of Pune district.

The industrial alcohol will be used for the manufacture of mono-ethylene glycol, ethylene oxide and other glycols at the Bhare unit which will have an annual production capacity of 50,000 tonnes of monoethylene glycol, 10,000 tonnes of ethylene oxide and 7000 tonnes of other glycols.

Sugar factories in the country produce over 13.5 million tonnes of sugar and about 40 lakh tonnes of molasses a year as byproduct. By the conventional batch process the output is 800 million litres of industrial alcohol at the rate of 220 litres per tonne of molasses.

By switching over to the continuous process the yield can be raised from 280 litres to 300 litres per tonne of molasses which will help in the fuller utilisation of the installed capacity of 1530 million litres of alcohol.

INDIAN STANDARDS RELATING TO PETROLEUM, COAL AND RELATED PRODUCTS

The Bureau of Indian Standards has published the following new and revised Indian Standards relating to Petroleum, Coal and Related Products: IS:702-1988 — Industrial Bitumen (**second revision**); IS:1448 (P:128)-1988 — Methods of test for petroleum and its products (P:128) Determination of nickel in calcined petroleum coke; (P:129) — Determination of polymeric content in lubricating oils base stock; (P:131) — Determination of silicon in petroleum coke; IS:3986-1988 —Sodium lauryl sulphate for cosmetic industry (**third revision**); IS:4105-1988 — Styrene (vinyl benzene); IS:9830-1988 — Water soluble sodium carboxymethyl cellulose for cosmetic industry (**first revision**).

Copies of the Indian Standareds are available from the Sales Services at BIS Headquarters at New Delhi and Regional and Branch offices located at Bombay, Calcutta, Chandigarh, Madras, Ahmedabad, Bangalore, Bhopal, Bhubaneswar, Guwahati, Hyderabad, Jaipur, Kanpur, Patna and Trivandrum.

INDIAN STANDARDS RELATING TO CHEMICALS

The Bureau of Indian Standards has published the following new and revised Indian Standards relating to chemicals: IS:61-1988 — Slate powder for paints (**first revision**); IS:4658-1988 —Coated paper and boards (art and chrome) (**first revision**); IS:8017-1988 —Vitreous enamelled reflectors for use with illuminating device (**first revision**); IS-11490-1985 — Methods of radiological test for water; IS:12125-1987 — Benzotriazole photographic grade; IS: 12495-1988 — potassium ferricyanide, photographic grade; IS:12496-1988 — Sizes of film for industrial radiography.

Copies of the Indian Standards are available from the Sales Services at BIS Headquarters at New Delhi and Regional and Branch offices located at Bombay, Calcutta, Chandigarh, Madras, Ahmedabad, Bangalore, Bhopal, Bhubaneshwar, Guwahati, Hyderabad, Jaipur, Kanpur, Patna and Trivandrum.

Enzymes - New breed of chemical engineers

There is a new breed of chemical engineers who operate with accuracy and precision in highly toxic conditions. What is more, these engineers work without pay, for they are enzymes, complex proteins found in all organisms, which are able to either bring chemicals together into large macromolecules, or break them down.

Many of these enzymes are not only immune to noxious chemicals, but can also break them down to harmless substances. The enzyme cyanide hyderatase, for example, converts cyanide to a less harmful formamide. Commercial implications of this discovery were obvious: Cyanide is widely used in the manufacture of paints, plastics and electroplated metals, and is frequently an unwanted byproduct in many other industrial processes including the manufacture of coke and steel.

ICI made good the discovery and is currently marketing an enzyme-rich dried fungal concentrate under the trade name cyclear.

Apart from being used in the chemical industry, enzymes have also found a niche in the pharmaceutical sector. Important drugs such as antibiotics and beta blockers can be altered to improve their effectiveness by slight changes in chemical structures. Some of these can be carried out only by enzymes (by biotransformation) because they require accurate, piecemeal chemical changes and these are the hallmark of enzymatic activity. One very useful characteristic of enzymes is their ability to produce chemicals in just the right form. All molecules are mirror images of each other (and are known as the right-handed and left-handed forms).

Although the composition of both forms is identical, each have different properties. The drug thalidomide, for example, in one form produces beneficial results and in the other, causes birth defects. By using enzymes, products can be made in either their left or right-handed forms and this is not possible using traditional synthetic techniques.

Previously, the commercial use of enzymes was limited as many industrial processes use compounds that have poor solubility in water. Whereas they work best in biological environments. However, according to Dr. Anne-Maria Brennan of the University of Kent, several methods of using enzymes in organic solvents have been discovered.

One involves the use of slightly "damp" enzymes: investigators have found that such nearly anhydrous enzymes can do their job in surprisingly little water. In another method, water is chemically bonded to the enzyme using a coating of a bonding compound such as polyethylene glycol. Water molecules stay tightly bound to the enzyme and enable it to function while in the organic media.

Such discoveries have encouraged big industrial houses to carry out research on the varied uses of enzymes, with some successful results. Unilever of the UK and Fuji Dil company of Japan have both developed biotransformation systems in which cocoa butter can be made from relatively simple oil such as palmoil.

One of the world's most comprehensive databases on artificial intelligenc and related topics is now available to a countries. At Glasgow, the AI databas is being updated daily. A new tape i sent to data-star every month to provid what is said to be an unrivalled sourc of the latest information on researc applications and market trends in suc matters as experts and knowledge base systems, machine learning pattern rec ognition, advanced robotics, neural ne works, software and many other aspec of AI.

A protein called RAS has been foun to be responsible for the proliferation cells in cancer. This protein needs ch lesterol in order to function. More sp cifically, RAS must first hook on to

bstance (the molecule farnesyl rophosphate) situated on the cell embrane. But this substance is also quired in the body to produce blood nolestrol.

Thus, when the blood cholesterol vel is low, farnesyl pyrophosphate is sed for its production and, hence, ecomes available for the attachment of AS. According to Pharma Information, a publication of Ciba-Geigy, Roche and Sandoz, anti-cholesterol rugs could become a new cancer eatment.

BANKS TO PAY DUTY DRAWBACK

Exporters will now be free to seek ransfer of their admissible drawback mount for deposit in a bank account which they may open with any bank ncluding even private sector and foreign banks.

The Government has, however, prescribed that details of the particular bank, account number and a consent letter for such transfer should be given sufficiently in advance to the custom house concerned, says an office release.

As per the procedure of disbursement of drawback hitherto in vogue at all major custom houses, the drawback claim, as found to be admissible by the custom house owhere the claims are filed, is transferred to the exporter's account in bank whose particulars have to be filed in advance with the custom house concerned.

Though the exporter has the privilege to open his account in any bank, for receiving drawback payments certain restrictions were imposed in February, 1986, on administrative considerations and the drawback payments could be received only in an account with SBI or any other nationalised bank.

Representations had been received from exporters and certain banks which were denied the facility of deposit of drawback of their clients.

US LAW SOON ON USE OF CHEMICAL FERTILISERS

Legislative measures are under way in the US to check the enormous harm being caused to the soil due to increasing application of chemical fertilisers and pesticides.

Disclosing this to newsmen at Delhi, Dr. J.F. Parr, Coordinator said, a Farm Bill to this effect will be introduced in the US congress this year. The Bill provides incentives to farmers who slash down the use of chemicals by 40 per cent in the next two years. Mr. Parr said the US Government had to initiate the measures due to pressure from environment groups which had campaigned against the use of chemical fertilisers.

Though there is a need for cutting down the consumption of fertilisers, Dr. Parr said, the stage has not reached when farmers can go without fertilisers. 'What is needed is a judicious use of fertilisers'', he said.

Mr. Parr is in India in connection with a four-day international symposium on natural resources management for a sustainable agriculture, identity constraints and will formulate agriculture beginning shortly.

About 400 participants, including 40 from abroad, will deliberate on the prospects of sustainable agriculture in semi-arid tropics.

The symposium, structured into three plenary sessions, will review the research work done on the management of natural resources for a sustainable agriculture, identity constraints and will formulate guidelines for further development research and training.

It will also discuss over-exploitation of land and water resources during the last four decades leading to deterioration in soil health and nutritional imbalance.

Costly technological battle to fight pollution

A group of chemical companies is fighting a costly technological battle to cut pollution from the manufacture of one of their most profitable products. The story concerns titanium dioxide, a brilliant white pigment obtained by processing titanium ores. It is used as a whitening agent in a number of everyday products, including paints, paper, plastics and cosmetics.

The manufacture of titanium dioxide, which produces large amounts of waste, has proved highly profitable in the past few years. This is despite the high cost involved in dealing with the residues, as anti-pollution legislation is tightened up around the world.

Companies making the material are being forced to examine not only production and marketing, but also ways to minimise the environmental impact of their operations. This is typical of the kind of pressures many businesses will face in the 1990s.

The past few years have been good ones for the four companies which control 60 per cent of world titanium dioxide production. This amounts to three million tonnes a year, worth about eight billion dollars. Two are from the US —Du Pont, the world leader, and Kronos, formerly NL Chemicals; two are UK-based — Tioxide, a joint venture between Imperial Chemical Industries and Cookson, and SCM, owned by Hanson.

But the good times may be coming to an end. There are indications that demand for titanium dioxide may be starting to level off, in line with slower economic growth in many developed countries.

Taken with a planned increase in titanium dioxide manufacturing capacity, the sector may be heading for a repeat of the problems which hit producers a decade ago, when demand and prices were at rock bottom.

Titanium dioxide production is extremely difficult. It involves a range of processess and seems more like a black art than a science.

Two main technologies are used to make titanium dioxide, the sulphate and the chloride routes. The former is more environmentally obstrusive, but cheaper and less complicated. Du Pont bases all its production on the chloride technique, mainly because it involves fewer waste products. Environmental pressure in the US has been especially strong in this area and none of the country's titanium dioxide plants use sulphate technology.

In recent years, Du Pont has spent hundreds of millions of dollars on improving its chloride manufacturing process, which it invented in the 1970s. The company does not license its technology to anyone else. Neither do SCM and NL, which also use the chloride route, though to a lesser extent than Du Pont. Of the big four, the ICI/Cookson venture is the only one to base most of its production on the sulphate route.

Most European plants use sulphate technology, in spite of its environmental impact. The main problem with the sulphate route is that it creates large amounts of residue in the form of dilute sulphuric acid. In northern Europe, most titanium dioxide plants are on the coast or close to rivers. Until recently, much of the acid waste was dumped into the North Sea, either directly or by barge.

Under environmental rules introduced by the European Community in 1982, the volumes are gradually being reduced. This is done via complicated and energy-intensive recycling plant, which converts the acid back into a concentrated form for re-use in the production process.

In 1988, titanium dioxide factories in Britain, West Germany and France poured roughly four million tonnes of this waste into the North Sea. This year the level is due to go down to three m lion tonnes and by the mid-1990s should be zero.

In other parts of Europe, where plan are not close to the sea, manufacture neutralise the acid residue by mixing with chalk. But this leads to large a unsightly waste dumps on land. The co of disposing of the acid by recycling h imposed heavy pressure in West Ge many, where all the titanium dioxid producers use sulphate technology. A have been forced by legislation to intr duce recycling in the past few year

As an example, Sachtleben, a sma West German titanium dioxide make a few months ago opened a DM 2 million (pounds 70 million) recycli plant at Duisberg. The company, part the Metallgesellschaft industrial grou says the procedure adds 25 per cent production costs.

The extra expense is also a sore poi with other West German producers the material, including NL, which h two plants in Germany, and Bayer, t diversified chemicals group. NL sen its wastes to the Sachtleben facility f recycling, while Bayer has its ov plant.

All these companies have had to st their recycling operations ahead groups in other parts of Europe becau of their country's tough stance on env ronmental protection. While West G many agreed to implement the 1982 E rules on cutting out acid dumping by t end of 1989, other countries, such France and Britain, have given th producers until 1993.

The German producers say the del benefits other makers, among them t ICI/Cookson joint venture and Franc Rhone-Poulenc, which have continu to dump most of their acid into the s We are put at an absolute disadvanta says Heinrich von Kleist-Retzo Sachtleben's chairman. We hope harmonisation between the differ

...untries as soon as possible, says Hermann Strnger, chairman of Bayer. Im ...ancoks, SCM's director in Europe, ...ys the German companies are not the ...ly groups which have had to spend ...rge sums on pollution control in this ...dustry. SCM, at its titanium dioxide ...ant in Grimsby, on Humberside, has ...ent £50 million over the past few ...ars on improvements on its chloride ...chnology.

Tioxide, the ICI/Cookson venture, ...s not yet finalised how it will cope ...th the problems of acid disposal in its ...rge European factories. The group ...ns one of these in the UK, also at ...rimsby, and another at Calais, France. ...oger Clegg, Tioxide's environmental ...anager, says the group will spend ...20 million over the next seven years ...proving the environmental perform...ce of its sulphate plants world-wide, ...ough it has not yet settled on the tech...logy.

– Financial Times Service

...DUSTRY URGED TO OBSERVE ...OLLUTION NORMS

Industries responsible for air and ...ater pollution are likely to face a tough ...ne unless they start taking immediate ...llution control and monitoring mea...res.

This warning, was given by the ...nion Minister of State for environment ...d forests, Mrs. Maneka Gandhi, in her ...rd hitting inaugural speech at the ...tional meet on: "Industry and envi...nment," organised by the Confedera...n of Engineering Industry (CEI) at ...alcutta.

Mrs. Gandhi said it was deplorable ...at we were now thinking in terms of ...cupational hazards developed due to ...r and water pollution, after having ...eated these hazards ourselves. She ...ged the captains of industry, however, ...induct pollution control and monitor...g devices to check pollution. Mean...hile, the World Bank, satisfied with the Union government's policies towards checking pollution, is learnt to have agreed to provide funds for undertaking anti-pollution programmes. Mr. Mahesh Prasad, secretary of the Union Government ministry, informed, that his department was expecting $300 million from the World Bank in the Eighth Plan. Detailed negotiations had already started with the Bank.

Mrs. Gandhi pointed out that stringent measures would be taken against the automobile sector for not adopting pollution safeguards. Air pollution was maximum in Calcutta, Bombay and Dehi. Her statistical information suggested that 70 per cent of pollution generated was from two-wheelers and three-wheelers. This apart, emission from power plants was causing concern. She also cited examples on how distilleries and tannery units were indiscriminately discharging untreated effluents. She critisied industrial units, particularly tanneries, located in and around Kanpur for polluting the Ganga waters.

It was ironical that pollution control boards in most of the states as well as at the centre did not work at all. Against this background, she requested CEI members to take a lead for implementing pollution control measures which are being initiated by her ministry. She expressed her unhappiness about the performance of the West Bengal government in regard to implementation of the Ganga action projects. A total of 111 projects under the action plan were given to the state government for implementation, and for that, necessary funds were allocated. But it was unfortunate that barring only 10 projects, the stage government had failed to complete the projects.

The discharge of wastes being generated by thermal power stations and steel plants was causing severe pollution and was detrimental to ecological imbalances. Mrs. Gandhi wanted that fly ash should be utilised for brick making purposes. In this regard, she requested industrialists to help set up fly sintered/-brick making units. She reminded the exports and commercial houses that they had to play a pioneering role for checking pollution.

She was against indiscriminate deforestation. Rather, she wanted commercial houses and various voluntary organisations to take up the challenge to plant trees throughout the country. Her ministry had an ambitious plan to plan about 150 billion trees during the Eighth Plan.

Mr. Aloke Mookherjee, while explaning various programmes being initiated by CEI to propagate the need to take up pollution control measures, said that the Centre should provide fiscal incentives to the domestic engineering industry so that the engineering units could find the manufacturing of pollution control devices lucrative.

Mr. J.P. Chowdhury, said that every year over a billion gallons of pesticides were sprayed on crops and soil. Most of these chemicals are semi-hazardous. Yet, several countries, including India, continue to produce them in large quantities.

According to him, the total land surface of the world was about 13 billion hectares, 10 per cent of which was used for agriculture. A third of this land would be threatened with desertification each year by the end of this century, an area roughly the size of Sri Lanka. Every year, 20 million hectares of land were destroyed or seriously degraded, a quarter of this by commercial logging, he said.

SCIENTISTS CALL TO COMBAT GLOBAL WARMING

More than 700 scientists, including 49 nobel laureates, have called on the US President. Mr. George Bush, to exert stronger leadership in dealing with global warming. "Only by taking action now can we ensure that future gene-

rations will not be put at risk," said the appeal sent to the President by the scientists, who represent a broad range of disciplines from medicine to physics. The group included more than a third of all the members of the National Academy of Sciences.

The expression of concern from the scientists came days before the opening of a new round of meetings of the inter-governmental panel on climate change, which is examining global warming and effective responses to it.

The Washington proceedings, which are expected to be attended by representatives from more than 60 countries, are part of an effort to draw up an international agreement, perhaps next year, on what to do about global warming.

Many environmentalists have chided President Bush for failing to endorse specific reductions in so-called "greenhouse" gases, especially carbon dioxide.

Some European countries have argued that industrial nations should commit themselves to at least a 20 per cent reduction in carbon dioxide emissions by the year 2000.

But the Bush Administration has argued against such a commitment because on determintion has been made on the economic impact of such curbs. Carbon dioxide, primarily from the burning of fossil fuels, accounts for about half of all greenhouse gases worldwide.

The US accounts for a fifth of all green-house gas emissions. The letter to Mr. Bush calling for immediate action in dealing with global warming was circulated in the scientific community by the union concerned scientists, which has been critical of the administration's policy on global warming.

ANNUAL CONVENTION OF ESSENTIAL OIL ASSOCIATION OF INDIA INDIAN ESSENTIAL OILS FOR 2001

The 32nd annual convention of t Essential Oil Association of India wo be held at Goa on 10th, 11th and 12 May, 1990. The highlights of the co vention will be a buyer-seller meet, p fumery talent competition, lectures new oils, processes, technology, co mercial aspects and export potenti Those who are desirous of present papers at the seminar are requested send their papers to the convent office addressed to Mr. G.S. Ran Chairman, Technical Committee. registration and other details con Mr. Satish Nair, Convention Off C/o. Sanrad International, 302, Shiv shan Shopping Centre, Santa C (West), Bombay.400054. Ph.649 0

ONGC strategy to tap Bechraji field

The Oil and Natural Gas Commission (ONGC) has drawn up a detailed development plan for the Bechraji field in north Gujarat, rated the second best find in the State during the Seventh Plan after Gandhar.

The plan envisages drilling of about 140 wells and pushing up the production rate to about 7500 barrels per day by 1992-93.

Discovered in September 1987, the field is located in the heavy oil belt area round Mehsana. It has been delineated by drilling 20 wells and has been under trial production since July, 1988. The field at present produces about 388 barrels a day from six wells an ONGC spokesman said.

The present estimated geological reserves of the field are 30 million tonnes, which is expected to be further upgraded. The development scheme also includes cycle steam injection and steam flooding to enhance the recoverable reserves from three million tonnes to 12 million tonnes and raise the production rate to about 15,000 barrels a day by 1995.

According to the spokesman, drilling of two horizontal wells is being tried for the first time in an onland area by ONGC in this field.

These wells are expected to produce several times more than the normal vertical wells. More such wells are planned in the future.

Last year, the use of advanced exploration techniques resulted in the discovery of West Bechraji, an extension of the main field. The field lies in the Cambay Basin, extending from Mehsana in north Gujarat to Ankleshwar in the south. As many as 70 prospects have been discovered in this basin so far.

According to the spokesman rece exploration results from this basin sho that even well explored areas could st yield reserve accretion.

Discoveries like Gandhar, Nada ar Bechraji have reinforced this optimis Even established fields like Ankles war have shown an increase of 17 p cent in recoverable reserves over the l two years.

Exploration during the Seventh Pl period has added 365 million tonnes oil and oil equivalent of gas, taking t total geological reserves in the Camb Basin to 941 million tonnes, he sa

To accelerate seismic data acquisit for processing and interpretati modern exploration techniques being deployed in the region.

The Cambay Basin currently pro ces about 6.5 million tonnes of oil an ally. The terminal year production the Eighth Plan from the region wo be about nine million tonnes. Cum ative production, from the basin in Eighth Plan is expected to be 150 cent higher as compared to the Seve Plan, going up to 40 million tonnes f 25 million tonnes.

Gas production is also expected t doubled from 7.1 billion cubic me in the current year to about 14 bil cubic metres in 1994-95, the spo man added.

WHO AWARD FOR PROF. TANDON

Professor B.N. Tandon, Head o Department of Gastroenterology Dean of the All-India Institute of ical Sciences, New Delhi, has awarded this year's Sasakawa H Prize of the World Health Organis The award, one of the highest pri the WHO in the field of health, co of a statute and $100,000 and is aw for outstanding innovative wo health development.

Indigenous mobile rig joins ONGC fleet

The first indigenously manufactured mobile rig has been inducted into the Oil and Natural Gas Commission (ONGC) drilling fleet. The rig, procured from BHEL, would be deployed for drilling in Mehsana in Gujarat. One more mobile rig is expected to be put into operation in a couple of months in the same region.

The induction of mobile rigs would help boost the productivity of onland rigs, as a lot of time would be saved in transportation of the rig from one location to another.

A quantum jump in drilling operations is being envisaged during the Eighth Plan. As against the Seventh Plan target of drilling metreage of 4854 thousand metres, the Eighth Plan target has been put at 8404 thousand metres. Similarly, the number of wells to be drilled would increase from 1942 in the Seventh Plan to 3330 in the next Plan.

ONGC is also taking up drilling in areas which are relatively geologically complex and logistrically difficult. All this calls for an appropriate mix of rigs which would provide the desired flexibility to ONGC for optimal deployment.

Out of a total 94 owned onland rigs operated by ONGC, 41 have been procured indigenously from BHEL. Two of the offshore rigs have been fabricated by Hindustan Shipyard Ltd. and Mazagaon Docks Ltd. The third offshore rig manufactured by Mazagaon Docks is likely to be commissioned in March this year.

According to official sources, a lot of emphasis during the Eighth Plan would also be laid towards rig deployment through charter hire from indigenous industry.

The various initiatives to improve drilling efficiency by ONGC include digging the rigs, modification of the rig mast, leap frogging, cluster drilling onland, horizontal drilling, induction of mobile rigs and desert-worthy rigs, measurement while drilling, and computer-aided drilling.

Cluster drilling is an innovative technique to counter the problems of land acquisition and saving on civil construction. Today, about 50 per cent of the wells are drilled in cluster.

Another important technology introduction has been the drilling of horizontal wells. The technique is used for obtaining oil from thin pay zones. Very few countries in the world possess this technology.

In terms of productivity, one horizontal well is as good as three vertical wells. So far, the commission has been successful in drilling seven such wells in offshore.

UB Petroproducts goes on stream

The joint sector propylene oxide project floated by the 'UB' Petroproducts Limited with the Tamil Nadu Industrial Development Corporation (Tidco) is all set to go on stream with the formal firing of the boilers by the chairman, Mr. Vijay Mallya, an NRI now presiding over the Rs. 4260 million strong UB group.

In an unscheduled event, the corporate executives of the company hurriedly organised the 'boiler firing' ceremony making use of the visit of Mr. Mallya to Madras in connection with the board meeting of Best and Crompton which he took over a few months ago.

All the civil and mechanical construction work is virtually over and the Rs. 71 crore project will be put on trial run in April, followed by regular production in June, the scheduled time originally planned.

Dr. R.C.K. Gupta and Mr. T.R. Sriraman, managing director and finance director respectively said that all the imported content of the machinery and instruments (equivalent to ten per cent value of the total project cost) have arrived and been erected.

From the indigenous suppliers side, 90 per cent, supplies have been effected and with the firing of the boiler, the trial run will be ahead of the original schedule.

The project being set up with financial participation by Montedipe of Italy to the extent of Rs. 250 lakhs and 'Tidco' Rs. 650 lakhs, will manufacture 12,000 TPA of propylene oxide, 8,000 TPA of polyols and 7000 TPA of propylene glycol at Manali. The 'UB' group and its associates (which includes Kamar Chemicals of Mr. Syed Yusuf, which was aquired by Mr. Mallya sometime back) will contribute Rs. 620 lakhs and public was offered Rs. 980 lakhs to make a total of Rs. 2500 lakhs equity base. Rupee loan from banks and foreign currency loans/term loan form the balance Rs. 4600 lakhs. The bankers are visiting the factory to have an assessment of the progress of the plant before it goes on steam.

UB Petroproducts Limited is one o the two main units coming up in Manal The Manali Petrochemicals Limite (MPL) of Spic is the second plant goin in for the same products with almos similar capacities but using a differen process, according to informed source The UB group has chosen the "ga based" route for polymeristion whil the MPL has preferred the liquid-base method. Both the plants will depen upon the neighbouring Madras Refin eries for their main raw material.

While the technology chosen by U is that of Pressindustria of Switzerlan MPL has obtained the know-how fro Ato Chem of France for propylen oxide and glycol and that of Arco o USA for polyol. MPL's project cost Rs. 101 crores. Dr. Gupta said, wh both the plants go on full stream th combined capacity will save the cou try foreign exchange worth Rs. crores. UB's plant is to first utilise per cent capacity and in the seco phase 75 to 80 per cent.

The corporate bosses have alrea initiated discussions on doubling t capacity.

UB officials said doubling the cap city was no problem since basic inf structure and technical knowhow w available. For a few months the co pany's focus will be on marketing t product which is widely used in va ous industries including pharmaceu cals.

According to Dr. Gupta, the Itali have agreed to give a recipe for pol plus iso cyanides and have also agre to help in marketing the package.

Kerala hails move to extend gas pipeline

Kerala Government considers a welcome step forward the Union Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy's instruction to the Gas Authority of India Ltd. (GAIL) to examine the feasibility of construction of a pipeline from the Western fields to the Southern region to take the natural gas from the Bombay High to the Southern States of Karnataka, Kerala and Tamilnadu to meet their power deficit and also to promote gas based industries.

Mr. Gurupadaswamy, in a letter to the Kerala Chief Minister, Mr. Nayanar, has also disclosed that the GAIL is already examining the feasibility of importing natural gas at a suitable location in the South.

Mr. Nayanar has brought to the notice of Mr. Gurupadaswmy that South was "totally bypassed" by the Centre in all the massive pipeline construction programmes during the past 25 years. The massive expansion in the production of natural and associated gas from nine million tonnes during the Sixth Plan period to 30 million tonnes during the Seventh Plan period (1985-90) was contributed mainly by the prosperity of only Western and Northern India. The spectacular development of the chemical, petro-chemical and fertiliser industries and power plants in Maharashtra, Gujarat, Rajasthan, Madhya Pradesh and Uttar Pradesh during the last few years was based on this gas. The 1700-kilometre Hazira-Bijaipur-Jagdishpur (HBJ) pipeline costing Rs. 1,800 crores carrying natural gas from the South Bassein oilfields off Gujarat coast, to the States of Rajasthan, Madhya Pradesh and Uttar Pradesh feeds six fertilizer plants, four gas-based power plants and many other industries to the tune of Rs 10,000 crores. This pipeline is proposed to be extended to Delhi and also to Haryana and Punjab. Before the election, the then Prime Minister was reported to have promised the extension of the HBJ pipeline to Bihar also at a cost of Rs. 600 crores. Experts have been advocating the building of a national grid for gas as a high priority project since it is the cheapest means of transporting energy from one place to another. Even if there are financial constraints, Oil and Natural Gas Commission is willing to mobilise funds from abroad to make the national gas grid a reality. Such a grid would create an economic revolution in the country, according to experts.

The Kerala Chief Minister, in his letter to the Union Minister for Petroleum and Chemicals, has said that the availability of gas from the western offshore wells is expected to increase from the present 30 million cubic metres per day to 70 million cubic metres per day during the Eighth Plan.

It should be possible to end the long neglect of the South in the matter of gas supply and do justice to it by immediately sanctioning a pipeline from the Bombay High oilfields along the West Coast of Karnataka and Kerala to supply gas to the Southern States. This may involve a distance of about 1200 kilometres costing around Rs. 1200 crores and this could be completed in two years. The value of gas flared at present is said to be more than Rs. 300 crores, a year. By saving this precious volume of gas presently flared, the cost of the pipeline to the South can be fully realised in a matter of four years. The Chief Minister of Kerala, has further pointed out that the gas can be used for setting up power plants in power-starved Kerala and other Southern States.

In the matter of additions to power capacity, only the Northern and Western States have been receiving considerable attention. The gas pipeline is already feeding five gas turbine stations in the North. The proposed West Coast pipeline can feed sponge iron and steel plants, fertilizer plants, chemical and petrochemical industries, triggering an investment of Rs. 10,000 crores in various industries in the South.

ONGC production plans for Gandhar belt

This vast stretch of barren land in the South Cambay Basin from north of Gandhar river to the Narmada in south-west Gujarat, where till a few years ago only salt was manufactured, has witnessed a sea-change after the discovery of "black gold" beneath the dry soil.

In this belt, covering 800 sq.km. the Oil and Natural Gas Commission (ONGC) has drilled 75 wells in the last five years which include 65 exploratory wells. Of these wells, 47 are connected to oil gathering stations and produce crude oil at the rate of one million tonnes annually.

Giving this information to newsmen at Gandhar, an ONGC spokesman said the Commission envisaged the production of three million tonnes of oil and condensate annually and 10 million cubic metres of gas per day by 1994-95 when another 75 wells are planned to be drilled.

The spokesman said that the capital investment for integrated development of the Gandhar belt had been proposed to be Rs. 1819.25 crores which included phase I development plant with an investment of Rs. 326.68 crores. This has already been approved by the Government.

The feasibility report for further development of the region has been submitted to the Government for approval, he said.

In reply to a question, he said that the success ratio in the belt was 1:1.25 which was very high compared to the international standard. The exploratory efforts have resulted in total accretion of 222.59 mmt. of geological reserves as on July 1, 1989.

In addition, about 230 mmt. prognosticated resources of oil and oil equivalent of gas are also available. An accelerated plan of production has been formulated to exploit these reserves.

At present, 13 deep rigs are already engaged in drilling operations in the belt. There are three oil and gas gathering stations and the field is linked to the main oil and gas trunk lines in south Gujarat.

The spokesman said that ONGC was creating the central processing facilities which would form the core of the total integrated oil and gas processing facilities for the Gandhar belt production and also the terminal point for oil, gas and liquefied petroleum gas (LPG) supply to the consumers and the refinery.

The oil and gas from eight gathering stations will flow through four different feeders and collector lines to the central processing facilities. The oil, after passing through the associated gas, will be stored in the transportation to the Koyali refinery. The lean gas available will be compressed in the gas trunk line for supplying gas to the consumers.

The crude processing facilities will consist of a crude stabilisation unit, gas dehydration unit, a condensate fractions unit and a gas sweetening unit.

The spokesman said the crude oil production in the western region had touched an all-time high of 6.74 mmt. per annum during 1989 by accelerating the exploration efforts and adopting new drilling techniques. Out of little over 6 mmt. produced during 1989, the north Gujarat fields contributed 4.1 mmt. and the balance came from south Gujarat.

Similarly, the total gas supply during the year was about 922 million cubic metres compared to 825 million cubic metres during the same priod in 1988. The western region also produced 41,567 tonnes of LPG in 1989.

The spokesman said the western region has planned expeditious development of newly discovered structures like Bechiraji, Gandhar and Nada. T Bechiraji field, which at present prod ces oil at the rate of 100 tonnes per da is expected to reach a level of 1,0 tonnes per day during the terminal ye of the Eighth Plan.

ONGC URAN UNIT TO BE FUN TIONAL THIS YEAR

The Oil and Natural Gas Commissi (ONGC) expects to flag off its ethar propane extraction plant at Uran by Ju this year.

The Rs. 135-crore facility will sup 4.5 lakh tonnes of ethane-propane ann ally to the Maharashtra Gas Crack Complex (MGCC) of the Indian Pet chemicals Corporation Ltd. (IPCL) Nagothane.

ONGC sources in Bombay, w claim that they are ready to supply gas to the MGCC, blame the IPCL not being able to commission the p elines between Uran and Nagothane time, leading to delays in the utilisat of gas. In fact, they say that the IP has not yet given a firm date to ONGC for the lifting of gas suppli

Before the Maharashtra Gas Crac Complex is able to receive the gas, w on providing communication facilit along the pipeline will also have to completed by the IPCL. The Nagoth complex will be equipped to manufa a range of petrochemical proje including various types of polyeth enes, ethylene oxide, ethylene gly polypropylene and acetylene bla Stressing on the need for simultane commissioning of ONGC's facili with that of downstream user industr senior ONGC officials said that del at the users' end leads to idle inv ments, besides flaring of gas. They p out that even in the case of the R triya Chemicals and Fertilisers' T project, the Oil and Natural Gas C mission was ready to supply the nine months before the former ready to receive it.

Industry status for natural gas supply

Natural gas is fuelling the growth of n infant industry — gas distribution for ndustrial and domestic consumers. The ouse of Mafatlals has launched a new ompany for the purpose in Gujarat. The hartias (Vam Organic group) hopes to eplicate what Mafatlal is doing on a arger scale in Uttar Pradesh. With its ead start, Gujarat Gas Company Ltd. GGCL), the unit promoted by Arvind Aafatlal group, hopes to have a say in imilar projects planned elsewhere in he country: it is now bidding for a gas istribution project in Pondicherry in the outh.

GGCL has already commenced disribution of lean gas in Ankleshwar. Enough pipes have been laid in Ankeshwar to make gas available on the itchen tap to some 10,000 households, n addition to small and medium-scale ndustrial units. To cover an estimated 5,000 households in the Ankleshwar-Bharuch belt, about 500 km. of pipeline s required. For distributing 1.20 lakh/ lay (out of the 1.7 lakh M3/day supplied by ONGC for the project) to industrial units in the area, only 36 km. of pipeline is needed.

In other words, domestic gas distribution is several times costlier than ndustrial distribution. Apart from an ntricate network of pipes and valves, it also requires equipment to depressurise gas to the low levels needed for domestic connections. The range is between one cubic metre per day for an average household to 10,000 M3 a day for an ndustrial unit. The gas pipelines run one metre below the ground. The pipes are a mix of MS and HDPE pipes.

Taking into account the current gas price, domestic supply is feasible only if the industry can subsidise household consumers. GGCL charging Rs. 3,000 per 1000 M3 and industrial units Rs. 2700 per 1000 M3. According to GGCL, the industrial consumers are bearing a slightly higher load to enable supply to households at Rs. 3000. GGCL is paying Rs. 1930 for 1000M3 of gas to Oil and Natural Gas Commision. 17 M3 of gas is equivalent to the contents of one LPG cylinder costing Rs. 65. In contrast, gas will cost Rs. 51 a month.

GGCL is charging Rs. 1000 as deposit from household consumers. Wherever meters are not installed, the company is charging on the basis of number of people in the house. In the absence of meter, there is a tendency to waste gas — consumption is 20 per cent higher than LPG. This is very evident in Baroda where many people keep their gas burners on during winter just to keep their houses warm.

Being the pioneer in the field in India, GGCL is finding itself involved in related fields like vendor development. Ancillary equipment includes valves, burners and meters for small consumers. The boiler now fired by coal or furnace oil also has to be converted to receive gas. GGCL is now giving free technical advice to prospective industrial consumers.

The company is also looking to selective technologies from world leaders like British Gas and Sofregaz to incorporate the latest safety standards and cost-effective practices in India. Apart from using as a cooking gas and an industrial fuel, natural gas can replace electricity, costly gases like oxyacetylene and LPG in several industrial applications.

The second project under implementation by GGCL is gas distribution in Surat for which three lakh M3/day of gas has been committed. This project is to go on stream in 1991. The Ankleshwar-Bharuch and Surat projects will cater to about 7.5 lakh people and more than 1000 commercial and industrial establishments.

GGCL's most ambitious project till day is for Ahmedabad city and suburbs for which a detailed market survey and technical-commercial study has been prepared. As per the study, about five lakh families in the city and suburbs will switch over to piped gas. In addition some 700 small and medium-scale units and most of the textile units like to change over to gas. The present requirement is about two million M3/day which will go up to 2.6 million M3/day by the end of the century.

The State Government is also very keen to expedite the project because of its potential to minimise pollution levels in the city. The Ahmedabad project will cost about Rs. 250 crores. The company proposes to go public before it embarks on the project. It also plans to execute projects on a turnkey basis outside the state.

Like in all new enterprises, it is not a cakewalk for GGCL. A section of the industry in Gujarat resent the monopoly position of the company which will grow stronger in coming years. They point out that Gujarat is paying the highest energy cost. All these years, authorities used to explain it away by pointing out that it is because of the high cost of coal which has to be transported all the way from Bihar. Now that Gujarat has emerged as the gas bowl of the country, industries have to pay Rs. 800 more than the ONGC price to GGCL, for gas. Why should the Goverment bestow a monopoly to a private house, they ask. If Gujarat Industries Development Corporation (GIDC) can distribute water and other basic amenities in its area, why was not the task of gas distribution also not entrusted to it? They also resent the in-built escalation of two per cent every year which GGCL is charging. GGCL says this is to absorb maintenance and increase in overhead charges. It is also an indirect guarantee that GGCL, on its own, will not hike charges above two per cent. With such a clause, what will be the coming generation paying for gas produced from their own soil. GGCL's detractors ask. They also question GGCL's claim that

27 industrial units have already signed up with the company. To be fair to GGCL a comparison of project details of its Ankleshwar project and that of Gas Authority of India Limited (with technology from Sofregaz of France) in Greater Bombay, reveals that the former is more efficient and cost-effective than the latter. GAIL plans to charge the same price to industrial consumers despite the fact that GGCL will be paying a higher gas price to ONGC.

The Bombay project promises to be a white elephant costing Rs. 420 crores (including Rs. 113 crores in foreign exchange). The comparable GGCL project cost is Rs. 25 crores, with no foreign exchange outgo. What is worse, GAIL wants the Government to phase out LPG from areas where they plan to supply gas on the tap.

GAIL also wants freedom to decide areas which are economically suitable for supply of gas. GAIL has also asked the Maharashtra Government not to charge sales tax, surcharge and turnover tax, so that its gas purchase price will be as low as Rs. 1540 per M3. GAIL will also refuse to supply gas to buildings under repairs, congested areas and semi-permanent structures.

ONGC RECASTS INDIGENOUS DEVELOPMENT GROUP

The Oil and Natural Gas Commission has restructured its indigenous development group at its corporate headquarters and regional centres, to make it more responsive to the requirements of the industry associated in providing material equipment and services, a spokesman of ONGC said recently. The indigenous group has enhanced its scope and would take up systems approach to execution of work in contrast to the prevalent practice of itemwise import substitution.

The revamping process, besides providing more teeth to the regional indigenisation cells, has helped in simplifying procedures and has provided new incentives for the industry to compete. The spokesman pointed out that the annual total expenditure on equipment, materials and services by ONGC during 1989-90 is estimated to be about Rs. 1800 crores, out of which the share of the indigenous suppliers would be to the extent of 50 per cent. This is a significant improvement from a level of 20 per cent procurements being made from the Indian markets about six years ago. The cumulative savings in foreign exchange till the year 1988-89 has been Rs. 4500 crores.

Describing the restructuring process, he added that at one level the corporate and the regional cells are being strengthened to facilitate better interaction with the industry. The other initiatives taken at the regional cells include expediting the process of factory inspection for registration to provide a detailed feedstock on the performance of the items under development. At another level the indigenous development group interacts with the various user groups in the regions in order to monitor the performance of the products developed indigenously as well as those under development.

The interaction with the various reputed national R and D institutes and universities provides new ideas for application. While ONGC is trying to initiate a dialogue with the Centre to simplify governmental procedures regarding availing deemed export benefits, import licences etc, the indigenisation procedure at ONGC is also being recast. The registration procedures, particularly those of the chemical manufacturing units have been streamlined to cut down registration time. The regional centres have been empowered to register firms under the indigenous development programme. In order to support the industry in the product development stage, the development order in many cases are being placed on single limited tender basis on registered firms, alongwith providing these units with the technical assistance during development

According to him an effort is bei made to bring more items of recurri nature under the annual rate contract provide assured business. A major dec sion has been taken recently to awa rate contracts to such indigenous co panies which have proven expertise a capacity to manufacture the item f providing services already successfu tried by ONGC.

This has already been initiated in t case of well heads, valves, oil w cement etc. The Government h declared supplies to the oil sector international price as deemed exp The raw materials components, spa goods etc. imported in connection w onshore and offshore exploration a exploitation activities are levied wit flat concessional customs duty of 30 cent.

The industries developing produ and services for ONGC are allow longer delivery schedules, expediti field trial testing, feed back of perfo ance and suggestions for improving performance. In order to allow the in genous industry greater time for de lopment, the quantities so earmarked kept outside the regular requireme he stressed. ONGC alongwith the C federation of Engineering Indust (CEI) has taken a decision to recon tute its joint working groups to br under its fold more areas in orde optimally utilise the indigenous in tries capacity and expertise in its p gramme of work.

Present, the areas where joint w ing groups have been set up include ling, mud logging and planning. ON has also requested CEI to furnish it information regarding the capacity Indian manufacturers in terms of licensed and installed capacities, pre and proposed product line and their tinguishing and distinctive features. would enable ONGC to place or directly with indigenous parties.

SPOTLIGHT ON

Biotechnology & Life Sciences (Part 1)

BIOTECHNOLOGY — ITS DEFINITION & ITS PRODUCTS IN DIFFERENT CATEGORIES

The European Federation of Biotechnology has defined biotechnology in perhaps the best manner in recent years. It has defined biotechnology as the integrated use of biochemistry, microbiology and engineering sciences in order to achieve technological (industrial) application of the capabilities of micro-organisms, cultural tissue cells and parts thereof. In short, biotechnology is the application of biological agents in either manufacturing industry or service operations.

The use of the term biotechnology may imply a single subject but the essence of biotechnology is its multidisciplinary nature requiring a wide range of science and engineering inputs.

Contrary to popular belief biotechnology is not a recently emerged subject, but dates back to Sumerians and Egypians of 6000-4000 BC. The development of biotechnology can be divided into five eras as indicated below.

Biotechnology — calendar of events (After Houwink 1989)

Pre-Pasteur Era (6000 B.C. to 1865 A.D.)

* Brewing technique developed by Sumerians around 6000 B.C.
* Brewing extensively used in Egypt 4000 B.C.
* Use of yeast to form carbon dioxide to make bread introduced in ancient Egypt
* Discovery of alcohol distillation by Chinese A.D. 14 for production of high alcoholic beverages
* Alcoholic beverages (beer,wine)
* Dairy products (Cheese, Yoghurt)
* Other fermented foods

Pasteur Era (1865-1940)

Ethanol, butanol, acetone, glycerol
organic acids (citric acid)
Aerobic sewage treatment

Antibiotic Era (1940-1960)

Pencillin: submerged fermentation technology
Large variety of antibiotics
Animal cell structure and technology virus vaccines
Microbial steroid transformations

Post-antibiotic Era (1960-75)

Amino acids
Single cell protein SCP
Enzymes (detergents)
Immobilized enzymes & cell technology (Glucose isomerase)
Anaerobic waste water treatment (biogas)
Bacterial Polysaccharides (Xanthan)
Gasohol

Era of New Biotechnology 1975

Hyderidome technology; Monoclonal antibodies
Monoclonal diagnostic tests (1980)
Genetic engineering (1974)
Animal diarrhoea vaccines (1982)
Human insulin (1982)

Major events that have occurred in commercialization of new biotechnology are:

* 1973 First gene cloned
* 1974 First expression of a gene cloned in a different species of bacteria
* 1975 Monoclonal antibodies
* 1976 First firm (Genentech) to exploit recombinant DNA (r DNA) technology
* 1980 UK Biotechnology Report (Spinks)
* 1981 First monoclonal antibody diagnostic kit approved in USA
* 1982 First x-DNA animal vaccine (colibacillosis) approved in Europe. First r-DNA phrmaceutical product, human insulin.

Several new techniques in recent years have been documented in the development of modern biotechnology. They are:

* Tissue culture, plant and animal cell
* Protoplast fusion
* Protein structural modification (protein engineering)
* Immobilized enzymes and cells
* Biosensors
* Use of computers in fermentations
* New Bioreactor designs.

(*Biotechnology for enginers: by A.H Scraff*) (*Published by Ellis Harwood Ltd. UK.* p.p. 19-24).

BIOPOL-A NEW MICROBIAL ORIGIN BIODEGRADABLE PLASTIC ON THE HORIZON

Malborough Biopolymers (an ICI subsidiary) will be manufacturing in commercial quantities by the end of 1989 Biopol, a biodegradable plastic produced by microorganisms. It will start marketing a Biopol bottle in Germany in early 1990. ICI is spending £10 million to double the capacity of its pilot plant at Billingham, where Biopol is produced. The new plastic consists of polyhydroxybutyrate (PHB) which is made by the Alcaligene, eutrophus bacterium in response to nitrogen deficiency.

ICI's version has the bacteria add 5-20 percent of hydroxyvalerate to the PHB chains to strengthen the material. Biopol, PHB-V, is similar to polypropylene and lends itself for use in films and bags. Because the plastic is made by microorganisms, it is also completely biodegradable. Not only would the environment benefit from this but applications in medicine could also have significant potential, such as biodegradable implants. Interest in Biopol is overwhelming and company foresees a good future market. (*Chem & Ind.*, 10/16/89, p. 663).

RESEARCHERS ENDEAVOUR TO DEVELOP BACTERIA FEASTING ON T.CE. VINYL CHLORIDE D.L.E

Bacteria have reduced trichlomethylene (TCE) in groundwater from 3000 ppb to less than 100 ppb in a five day in-situ test according to ECOVA Corp. (Redmond, Washington) which did the work for an unidentified client near San Francisco. The results indicate that the method should be more effective and less costly than the conventional approach of pumping out and treating the groundwater, reports Michael Nelson, a senior microbiologist with ECOVA. 'If this works on a larger scale', he says — 'it would be possible to clean up the site in about a year, compared to five years for the pump and treat method.

The bacteria a natural strain of Pseudomnas cepacie, were pumped down a 100 ft. well, along with oxygen, nutrients and a special 'inducer' to stimulate their activity. The proprietary inducer is the key to the process's efficiency, explains Nalson. 'Without it, the bacteria will not maintain their activity for long'. Normally, the bacteria cometabolizes TCE with phenol, but ECOVA had to find a substitute for that undesirable substance.

In another direction, 'biostimulation' has been employed in a different manner by Stanford University (California) researchers in a test in a 'clean' aquifer under Moffeth Naval Air Station (Mountain View, Calif). In this case, measured amounts of vinyl chloride, TCE and cis- and trans- 1,2 dichloroethylene (DCE) were pumped down in injection well, then methane and oxygen were injected in alternating pulses.

The methane and oxygen stimulated naturally occurring bacteria (methanotrophs and heterotrophs) to degrade 95% of the vinyl chloride, 85% of the trans - DCE, 40% of the cis-DCE and 20% of the TCE, reports Paul Roberts, a professor of civil engineering and investigator. The work was sponsored by the EPA of USA and a feasibility study is now under way with a view to applying the technique to a superfund site in St. Joseph, Michigan. (*Chem Eng.*, 11/1989, p. 25).

NEW SUPERIOR VARIETIES OF OILSEEDS VIA BIOTECH RESEARCH AT *IARI*

Biotechnologists of the IARI, New Delhi, have in recent years achieved breakthroughs in their research on oilseed plant (Brassica species). These may provide the much needed opportunities for evolving new varieties of oilseeds for achieving self sufficiency in edible oils in future.

Among the genetically manipulated material having commercial potential, is the new source for resistance to shattering in rapeseed (Brasscia napus). One of the formidable handicaps in the cultivation of rapeseed throughout the world is the absence of resistance to shattering in the available germplasm. The gene carrying this character is therefore, expected to carry good international prices.

This gene has been successfully introduced into the plant through a complex technique of wild hybridization between species which are genetically difficult to breed. The reconstituted plant has shown normal flowering. According to the researcher Prof. V.L. Chopra, head of the biotech centre at IARI, this character can now be transferred to the species (Brassica Juncea) predominantly grown in India. Another significant achievement of the biotech centre is the evolution of over a hundred genetically superior (scientifically called somaclones) of the popular variety, Varuna. These lives have already gone through one year of experimental testing and have shown a remarkable improvement in some of the agronomic traits, especially early crop maturity. This helps the plants to escape moisture stress besides diseases and pests, including the dreaded aphid. (*TOI*, 3/9/89, p. 8).

IMPACT OF PATENT LAWS ON BIOTECHNOLOGY IN USA

A tremendous boost for the biotechnology industry has come from the extension of patent law to recombinant organisms in USA. Since the USA is the leading nation in biotech research, the patent law implications on biotechnology should come from that country. In the genetic engineering landmark decision of Diamond Vs Chakrabarty in 1980, the US Supreme Court held that man-made microorganisms are patentable as constituting a new and useful 'manufacture' or 'composition of matter' under Title 35, Section 101 of the US Code. Thus it became possible for a company to patent not only the finished product, the recombinant drug, but also the microorganisms containing the r-DNA from which the drug product was produced. Patent protection is critical for commercialization; without i pharmaceutical manufacturers are hesistant to commit major resources.

There are two major types of paten claims that manufacturers in genera will pursue in attempting to protect new product: process claims and pro duct claims. Process claims cover th methodology by which a product is nov produced. In the realm of r-DNA tech nology, process claims might cover spe cific cloning procedures, as well as th methods used to purify the r-DNA dru from the microorganism culture.

Product claims cover not only the en product itself, the r-DNA drug, but als the recombinant DNA molecules ar host microorganisms constructed f production of the drug. Manufacture often write both process and produ claims into a patent to obtain maximu proprietary protection for a new produ

With the advent of r-DNA techno-y, a new twist in patent battles has sen in USA. Since it is now possible produce the same protein by tradi-nal purification from human tissue d by cloning and expression of the ne, there are instances of two com-nies holding patents. Related to the oduction and use of the same protein olecule, Genetics Institute, for exam- holds a patent covering the use of ythropoietin purified from human tis-es; on the other hand, Amgen holds patent on the chemically identical but combinant version of erythropoietin. ch company brought suit against the her, charging infringement of patent hts. In another example, Scipps Insti-te, which holds a patent for purifica-on of naturally produced blood-clot-g factor VII:C, brought suit against enentech, which has cloned and pressed the factor VIII: C gene. ecombinant factor VIII:C would have ility in the treatment of haemophila A. ripps claimed that it patent covers the ocess of producing a purified factor III:C, whether from human tissue or recombinant means. As with other eas of patent law, the resolution of wsuits such as these will lead to a dy of legal precedents from which ill emerge a more defined framework r the crafting of biotech patents.

In general, the biotech industry rec-gnizes the need for patent protection d process patents favourably. In fact, e very processes of producing recom-nant molecules and cloning genes in icroorganisms are patented. The ohen-Buyer patent (Stanley Cohen of anford University and Herbert Boyer f the Univ. of California) covers the rocess of splicing genes from one rganism to another. Genentech holds patent on using microorganisms (bac-ria or yeast) as microfactories for pro-ucing a recombinant product. Because oth of these processes are fundamental r-DNR technology (and perhaps ecause of the expense of legal wran-ling), licenses for both types of patents ave been made available for reasonable fees. (*Am J Hospital Pharm*, 9/1989, p.p. 1842-43)

ETHYLENE BIOSYNTHESIS PATHWAY GENE ISOLATED

The gene coding for the key enzyme involved in the biosynthesis of ethylene in plants has been isolated by researchers at USDA's Agricultural Research Service Lab. (Albany, Calif).

Ethylene is the plant hormone that controls several stages of plant growth including fruit ripening. The researchers isolated the gene coding for ACC synthase from Zucchini. ACC Synthase catalyzes the formation of the ethylene precursor 1-aminocyclopropane-1-carboxylic acid (ACC) from 5-adenosyl-methionine. The researchers confirmed the gene's biological activity in E. Coli and yeast. In-vivo experiments showed that the ACC synthese gene is induced by a diverse group of inducers, including wounding Li^+ ions and the plant hormone auxin.

It may be possible in future, the researchers report, to reduce ethylene production in fruits and vegetables, and thus delay ripening, by reducing expression of the ACC synthase gene. This would be a significant benefit for the agricultural industry. (*Proc. Natl. Acad. Sc. USA* 86, 6621 (1989) (*C & EN*, 9/11/89, p. 21).

UNIDO FUNDS THIRD WORLD BIOTECH R & D

The UN Industrial Development Organization (UNIDO) has agreed to boost by $42 million its 1989 to 1994 funding for biotech research in the Third World. UNIDO recently concluded two trust fund agreements to secure the 5-year programme, worth a total of $60 million of the International Centre for Genetic Engineering & Biotechnology.

One of the Centre's laboratories at Trieste, Italy, will focus on the regulation of DNA replication of human cells, molecular biology of the papilloma virus; protein structure and lignin biodegradation. The other laboratory in New Delhi (India) will concentrate on plant biology, including stress tolerance; the replication and transcription of plant genes; immunology; the molecular biology of hepatitis and malaria; the design and synthesis of peptide antigens for disease resistance; and the synthesis of oligonucleotide probes used in DNA research. (*C & EN*, 9/11/89, p. 21).

MARINE ALGAE — A NEW SOURCE OF NATURAL PIGMENTS

An Israeli Company in Haifa (Israel) is doing research in developing natural pigments for cosmetics and pharmaceuticals from cultivated marine algae. Dr. Karl Laden of Haifa has developed beautiful lavenders, reds, greens and other pigments extracted from marine algae grown by cultivation. (*D & CI*, 9/1989, p. 119)

AN UPDATE ON WORLDWIDE ENZYME MARKET

The current world market for industrial enzymes is approximately $ 600 million (sales value). More than half of othe market is in the USA. The Table 1 below gives the details.

Table 1
Worldwide Enzyme Market

Enzyme	Market ($ million)
Alkaline proteases	150
Nuetral protesases	70
Rennins	60
Other proteases	50
Isomerases	45
Amylases	100
Pectinases	40
Other carbohydrases	10
Lipases	20
Others	55
TOTAL	600

Only small number of enzymes are used in large volumes. However, today there are as many as 19 enzymes used in industry as described below in brief in Table 2.

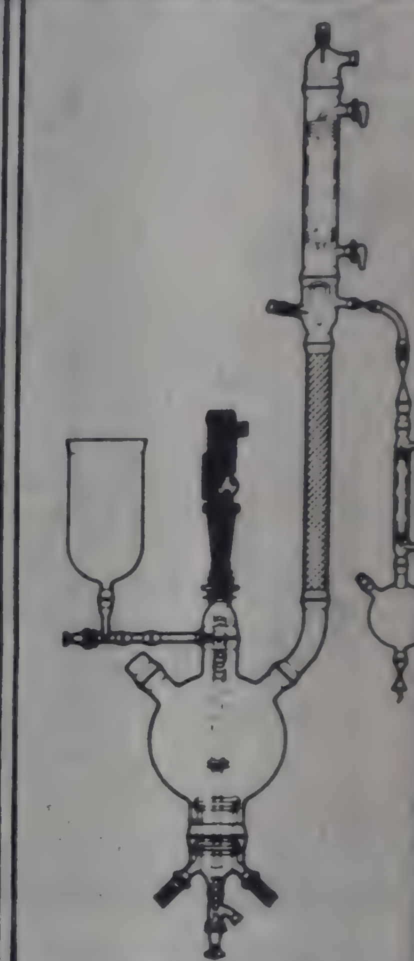
Recent advances in r-DNA technology, protein engineering and process development have begun to influence the industrial enzyme market in a very positive way in recent years. These advances will continue to both lower the cost of enzymes and to improve the enzymes' properties. For instance, the use of celluloses for processing biomass has, until now been limited by high enxyme costs, sub-optimal ratios of activities and low specific activities. Improved characterization of this multi enzyme system, development of DNA — mediated transformation systems filamentous fungi and enzyme engi ering have revitalized interest.

Recent advances in enzyme engi ering have introduced subtilism, chy osin, hydrolase lipases, amylases into commerce. These are r-D derived enzymes. (*Trends in Biot* 12/1989, p.p. 330/335).

Table 2

Sources & Application of Industrial Enzymes

Enzymes	Source	Applications
Bacterial/L-amylase	B subtilis/B licheniformis	Starch conversion
Fungal L-amylase	Aspergillus Oryzae	Maltogenic Saccharification
Amyloglucosidase	Aspergillus nigar var	Starch syringes, dextrose, foods
Pullinlanase	Klebsiella aerogenes	Debranching starch
B-Glucanase	B-subtilis/Pencillium emersonii	Brewing and food processing
Neutral protease	B-subtilis	Brewing/flavoring
Neutral protene	Asergillus oryzae	Baking
Alkaline protease	B. licheniformis	Detergents
Cellulase	Trichoderma Spp	Cellulose hydrolysis
Invertase	Yeast Spp	Confectionary
Pectinase	A. niger	Fruit/wine processing
Anthocyanase	A. niger	Decolorizing grapes
Rennet	Mucor SPP	Milk coagulant, dairy industry
Glucose isomerase	Strep. Spp.	High fructose corn syrups
Lipase	Mucor Spp/Aspergillus	Dairy industry, detergents, fat splitt
Lactase	S. Lactis/Kluyveromyces lactis	Dairy industry
Hemicellulase	A. niger	Baking, fruits, gums
Glucose Oxidase	A. niger	Analytical, food processing
Catalase	A. niger	Analytical, food processing



Risk assessment in chemical industries — A computer assisted approach

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ntroduction

In past three decades, a rapid industrialisation notably that f chemical industries, has taken place in India. Such indusries handle a wide range of flammable and toxic chemicals. Iazards associated with such chemicals result in fire, exploion or massive release of toxic materials, which can give ise to serious damage both in and beyond the vicinity of the ndustry. The issue of hazard evaluation and risk assessment as become a prime concern for the past four years. The tragdy like that of Bhopal has to take place to heighten the public wareness towards such issues.

Unfortunately, in India, though various mandates have been nade in this regard, a quantitative risk assessment is seldom erformed, probably due to lack of data as well as lack of nformation on the procedures involved in the risk assessnent. In order to assist in such quantification exercise, an BM Personal Computer (PC) based package was developed t CESE, IIT, Bombay.

Dutline of package

This computer package on risk assessment, acronymed as MinRisk, estimates risks for specified plant layout and allows eorganisation of layout to minimise the risks in an interctive mode.

The chemical industry is visualised herein as consisting of various clearly identifiable "units". MinRisk then quanifies the economic damage and individual risks, associated with each of the unit of chemical industry due to fire, exploion and toxic releases. The economic damage is quantified n terms of Maximum Probable Property Damage (MPPD) while the individual risk is quantified in terms of Fatal Accident Rate (FAR). The layout of the units can then be optimised in terms of other information in the neighbourhood rea so as to minimise both MPPD as well as FAR.

MinRisk is under continuous development and many more features are expected to be added in the near future. For example, scenarios for steady leaks from the chemical and storage equipment, options for parametric analysis and risk computations under probabilistic conditions are some of the identified extensions. Importantly, it is proposed to review the basic model of MPPD and FAR more thoroughly by requesting peer reviews and conduct evaluation from experts.

This package has a host of relevant databases, as oriented to chemical industries and includes layout planning routines for minimisation of the risk. The effort is to make a stand alone distribution package for risk assessment to achieve the following.

1. to hasten the chemical of industrial clearance and to make decision on clearance on more rational basis.
2. to assist the regulatory authorities, planners and designers to investigate the plant accidents (e.g. fire, explosion and toxic releases) and predict the possible consequence for decision making.
3. to remedify the layout and identify safety measures to be undertaken within the industry, so as to minimise the onsite economic damage as well as offsite risks to the society and environment.
4. to rank the plant layout based on the hazard potentials.

Features of MinRisk

MinRisk is menu driven and has full interactive facilities of data entry, validation, help as well as graphics. In MinRisk the user plots the general layout along with the boundary of industry plot for identifying the possible targets, such as office and plant areas, control room and flare location within the industry boundary; and surrounding areas such as next industry plot (which may also be affected and may become a potential second source of failure due to domino effect), public road and railways, and residential or commercial areas around the plant under consideration. After giving the required data about the plant under consideration, MinRisk does the risk assessment calculation and provides the result in form of tables and graphical display of layout.

In the graphical form, the zones or locations under hazard due to the potential incident from the plant under consideration, are then marked with blinking red colour so as to alert the user about the possible intensity criteria being violated. While in the tabular form, the zones found under risk are marked in red if the intensity criteria is violated. Here the user is allowed to change the location of the plant under consideration so as to choose that location which would correspond to possible minimum risk. If the plant location is changed in the graphics screen, a corresponding change is also made in the tabular results, showing appropriate changes in the risk computations due to new location of plant.

MinRisk also allows another option to reduce or increase the inventory of the storage and presents the change in the

estimated risk. Such a feature greatly helps in recommending both alternative site as well as recommending alternate storage capacities.

Also the user can first perform the hazard identification of the overall layout. This is done with the help of program written to calculate Dow's Fire and Explosion Index (F & EI). Based on the results obtained the user can rank the plant "units" depending on the F & EI value and may choose to perform the consequence analysis on that plant which has high F & EI value. He can also alter the layout of plants e.g. to explore separation of plants which have severe hazard potential from those plants which have significant economic value. Importantly, the user can also examine implications of incorporating the safety features in various plants which can reduce the F & EI value and hence the hazard potential.

MinRisk assembles the two models viz. Fibre and Explosion Index (F & EI) and Risk Assessment. Currently about 15 database files are used in association with corresponding index files. MinRisk occupies about 450 KB computer memory and can be executed from DOS prompt on any IBM-PC or its compatible with atleast 640 KB RAM.

Brief description of the models

The model used for quantifying the economic risk is adopted from Dow Chemical Company's "Fire and Explosion Index, Hazard Classification Guide" (1981). The Fire and Explosion Index (F & EI) is rated in terms of degree of Hazard such as light, moderate, intermediate, heavy and severe etc. and also provides an insight to identify measures which could be taken to mitigate hazard. A brief description of the F & EI used is as below.

F & EI is a number which quantifies the hazard due to fire and/or explosion of a given plant and is estimated as,

$$F \& EI = MF * UHF \qquad ... (1)$$

where, MF is the Material Factor and is defined as a measure of the intensity of energy released from a chemical compound, mixture of compounds, or substance (Lees, F.P. (1980)). UHF is the unit hazard factor and is the product of two penalties consisting of sum General Process Hazard (GPH) and sum of Special Process Hazard (SPH). Penalties for GPH and SPH are to be indicated on items which are considered to be relevant in the development of fire or an explosion. Dow Chemical Company, recommends for GPH six penalty scenarios and for SPH twelve penalty scenarios for examination by the user. All of the items which are applicable to a particular unit must be examined by the user and the appropriate penalty should be applied.

Economic risk to the surrounding plants is quantified in terms of Most Probable Damage (MPPD), and is estimated as,

$$MPPD \doteq ACF * Base\ MPPD \qquad ... (2)$$

where, ACF is the Actual Credit Factor attributed to the additional safety features provided in the units so as to minimise the area of exposure due to fire or an explostion and to reduce the probability and magnitude of unit or plant failure. ACF is a function of three types of credit factors namely (a) Process control (C_1), (b) Material Isolation (C_2 and (c) Fire Protection (C_3). Dow Chemical Company, recommends for Credit Factors twenty-two options for examination by the user. Base MPPD is the theoretical replacement value of a equipment within the area of "exposure" in millions of dollars.

Maximum Probable Property Damage (MPDO) is the range in days it will take to restore the plant after damage and is a function of MPPD. Once the relevant information is provided for each unit in a plant and on choosing the appropriate options provided, the package computes F & EI, MPPD and MPDO internally and displays results in the form of tables and histograms.

The other module viz. the risk assessment model which includes the computation of individual risk, is developed based on the method given in "Process Plant Layout", Mecklenburgh, J.C., (1985). A brief description of model is as follows

1. The stability class is decided as per method by Pasquill
2. The size of cloud, depending on the physical state of chemical after release whether gas, liquid or flashing condition
3. The explosion overpressure and the distances of various types of buildings such as school, housing, office, control room and various types of hazardous plants large or small etc. should be placed from the storage unit. The explosion overpressure effects uses TNT deflagration equivalent model.
4. The fireball size and the distance to the safe flux, at which there may be some casuality. The fireball calculation use the hydrocabon equivalent model.
5. The distance to Lower Flammable Limits (LFL) and t Immediately Dangerous to Life and Health concentratio (IDLH), is based on dispersion equation by Pasquill bu modified by TNO to give instantaneous concentration
6. The post consequence effect, i.e. vapour cloud formed du to evaporation and its distance till the cloud expands befor dispersing below the safe concentration of LFL and IDLH
7. The safe distance to vegetation, drenched tank, personn stationary or in emergency, escape route, plastic cable et which can be affected by the tank fire.

Data required for MinRisk

To set up a hazard assessment of a layout requires th assembly of a considerable amount of data, such as

1. Accurate layout plan of an industry.

2. Cost data for various installed equipment in a plant chemical unit.
3. Thorough understanding of the chemical flow and chemical conditions such as temperature, pressure, volume or mass at operating, starting and shut down of equipment.
4. Hazardous properties of material/chemical involved in unit.
5. Dimensions of equipment from which mass release be simulated.
6. Topographical features both on-site and off-site and environmental factors such as ambient temperature, stability conditions etc.
7. Knowledge on the behaviour of material on release.
8. Distribution of employees and the public around the plant.

Implication of layout

To achieve an almost optimal layout, the following steps can be considered depending on the F & EI value calculated as above

1. All units with severe and high hazard should be separated from the units of light, moderate and intermediate hazard.
2. Control room, amenity building, offices should be adjacent to the light or moderate hazard units.
3. Storages should be adequately separated from the main operational areas, and also as far away for the major roads and traffic route within the industry.
4. All units with severe, high and moderate hazard should have access for emergency vehicles from at least two directions.
5. All units with severe, high and moderate hazard should be appreciably separated from the possible ignition sources.
6. All units with large area of exposure should be separated from equipments of large economic value.

To achieve an almost optimal layout, the following steps can be considered depending on the risk involved as calculated above. There are few methods adopted for the implication of layout, but generally the common and current approach is done in two stages (Mecklenburgh, J.C. 1985). The approach is in two stages which use respectively intensity criteria and risk criteria.

The intensity criteria involves checking of the intensity at each target considered with the acceptable intensity criterion for that target. The criterion reflects the degree of protection to be given to that particular target so it may not or less affected by the incident which may take place. If this is less than the acceptable intensity criteria then the target is considered acceptably safe irrespective of loss of containment. If this is more than the acceptable intensity criteria then the intensity at target is to be reduced by considering

1. Shifting the target away from the source.
2. Reducing inventories.
3. Having less severe process conditions.
4. Reducing toxicity and flammability through having safer chemicals.

Layout can be confirmed by arrainging the plants such that intensity at the target is below the criteria.

The risk criteria involves checking the acceptable risk at the target and to examine subjectively if the risk of loss of containment is consistent with the acceptable risk criterion or can be made acceptable by improving the engineering and operational maintenance standards and by training operators in the correct disaster reactions. It is assumed here that if the criteria is violated then casualties change from zero to 100 per cent (though not in practice). Similarly the probability of transmission i.e. that the toxic and flammable vapour cloud will drift toward the target and that the vapour cloud will ignite, is assumed as 100 per cent even though all the vapour cloud may not be ignited or the vapour cloud may not be drifted toward target due to wind direction change or other factor. This simplifying assumption leads to the proposition that if the critical intensity at target is violated then the risk at the target is same as the risk of loss of containment.

For this intensity criteria, after studying all the likely source of release, one givng the greatest damage, only be taken for further assessment. But for the risk criterion, the contribution from all the source of release violating the risk criteria should be considered in assessing the risk at the target i.e. the risk from all the sources should be added in calculating the overall risk.

Limitation of MinRisk

There are few possible limitations of the MinRisk which are discussed as below:

1. It cannot accommodate wind directions while optimising the layout. Incorporation of wind direction would require major effort in software. Further it was felt that it would not be appropriate to bring bias of wind direction under risk assessment since it would be impossible to speculate which direction the wind would blow during the time of explosion.
2. The dense-phase dispersion is not taken into consideration. This limitation would be however considered in further modification of MinRisk.

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Disturbing price trends in chemical industries

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Indian chemical industries have been seriously affected by the seemingly unending vicious cycle of cost push inflation in the country during the last several years. This has resulted in a situation of increasing cost of production and the consequent spiralling of prices of the chemical products. In such situations of constantly increasing price trends, the dealers, traders and intermediaries have been successful in earning a disproportionately high income, by hoarding the products and adopting clever manipulative trading practices. Under such circumstances, trading in chemical products appear to have become more lucrative than manufacturing chemical products which is certainly a very unhealthy trend, from the point of view of the progress of the chemical industry in India.

Such prevailing price situations for chemicals in the country have pushed the cost of production of many other products in India, making them outpriced beyond reasonable limits in the international market; even assuming that the quality and specifications of Indian products generally match the prevailing world standards. Many Indian products have become unsaleable in the world market due to high price levels. In such situations, the government's efforts to protect and boost the export performance of the Indian chemical industry and related products, by providing special concessions, incentives and tax benefits could not yet yield the results to the desired extent. It is now clear that mere concessions, by themselves, cannot bring around any sort of improvement in the export front of Indian chemical industry, without a fundamental improvement in the situation, by curbing the cost of production and unhealthy speculative price trends encouraged by the traders. The poor export performance of the Indian chemical industry should not be ignored any longer, especially since huge amount of foreign exchange outflow is taking place by way of technical collaboration fees, import of raw materials and capital equipment.

In spite of huge investments in the chemical and other industrial sectors during the last three decades, the export earnings of India are still primarily contributed only by the traditional sectors like ores, plantation products etc. due to the locational and seasonal advantages that the country possesses. In such traditional sectors, the country appears to have reached a near saturation level, without any feasibility of any significant increase in export performance in the coming years. Whatever increase in earnings from such traditional sectors appear to be possible only due to the fluctuating price levels in the international market due to various reasons. Unless, India can make a breakthrough in the export front in the chemical sector in a significant way, commensurate with the size, potential and requirements of the country, any improvement in the export situation would not be possible. This would be so, since the performance of every sector like pharmaceuticals, plastics, paints, electronic goods etc. are invariably affected by the rising costs of chemical products.

While adequate emphasis has been laid in the country on the creation of production facilities and capacity utilisation in the chemical units, one tends to think that no effective measures, in the scale required, have been initiated to reduce the cost of production of chemical products.

In fixing the minimum economic capacity for chemical projects, the Government of India appears to be concerned only with the economic viability of the project under Indian conditions based on Indian price levels and the demand potentials for the product in India. It does not fix raw material/utility consumption norms per unit product in such projects, based on international standards. The project costs in India are disproportionately high compared to the advanced countries. The project costs often shoot up in chemical industry beyond reasonable levels, since the Indian chemical industries copy the pattern of project design, technology, plant layout and manpower planning techniques that are adopted in the advanced countries, whereas the capacity levels in India are much lower than similar plants abroad. When adopting the international standards of project design, the plant capacities should also be of international levels. Otherwise, the fixed expenses would only go high, making the cost of production uncompetitive in the world market.

Even while preparing the project schemes and assessing the viability of the projects, Indian chemical industries assume, atleast in most cases, that they would sell the product only in India at the Indian price levels. The prevailing price level for chemicals in India are atleast two times that of international levels and most of the chemicals produced in India cannot be sold in India itself, unless the government would protect the Indian chemical industries by imposing ban on the import of the products or impose very high level of import duty on such products imported. While working out the project schemes and profitability levels, Indian chemical industries consider only the prevailing price levels in India for the products, which are very high. In other words, the high price levels for sale of the product become the essential basis for investment in the industries itself; thus leaving no scope for the reduction in the price levels of the product at all. High-Tech chemical projects are being put up with huge

investment and often with imported technology and equipment spending huge amount of foreign exchange, thatwould finally produce products, whose cost of production in India would be often 200% than the world levels, with absolutely no feasibility for export.

Another major contributing factor for the high cost of production in the chemical industry is the high cost of financing the projects. This is an inherent and fundamental factor contributing to the high cost of production. While the interest on term loans for the projects charged by the government owned financing institutions as well as the interest on the working capital loan charged by the commercial banks are high by international standards, it is surprising that the government has allowed a large number of financing and leasing companies to operate in the private sector, who extend financial assistance to industries at exhorbitant and counter productive interest rates.

In extreme distress situations and due to the heavy delay on the part of the government owned financing institutions and banks in sanctioning financial assistance, industries, in the small and medium sector, are often forced to avail short term loans from private financing companies, who charge interest rates of as much 27% and more. The burden of high cost of production in such units, due to the high financing charges, are ultimately passed on to the consumers and th common man. It is surprising that the government is keep ing it's eyes closed to such situations. There is a strong cas for the government to consider imposing a total ban on pri vate financing companies extending loans at high interest rate to production oriented industrial units.

The cost of production of chemical units can be brough down, only if Indian industries would stop copying the Wes ern pattern and start adopting appropriate methods suitabl to our country. Many examples can be readily pointed ou Projects of investment of Rs. 100 crores and more are bein put up, that would employ hardly one hundred engineers. Bu the right approach for Indian conditions would be to avoi mechanisation to other levels possible to reduce the inves ment costs and promote better empoyment opportunitie Octanol plants are being put up with scarce propylene as th starting material, whereas the appropriate method for Indi would be to put up octanol plants with ethyl alcohol as th starting material. There is no doubt that the Government o India and the Indian chemical units have to do a lot of think ing on the subject and take bold and dynamic decisions i working out the growth plans for chemical units in the cou try, with high level of emphasis on reducing the investme levels in relation to output and the production cost of inte national levels.

Science Briefs

FILTER FOR FLUE GASES

The Danish company Haldor Topsoe, as developed a process for removing ulphur and nitrogen oxides from the lue gases of power plant, reports 'Appropriate Technology". Sulphur ioxide and nitrogen oxides, when eleased into the atmosphere, react with tmospheric water to produce acid rain which has the effect of stunting and killing trees and vegetation.

On the other hand, when sulphur is emoved from the emission of power tations by the catalytic "SNOX" process, it is converted into commercial grade concentrated sulphuric acid which s a valuable product used in the fertiliser industry. The SNOX process generates no waste products or waste water and no chemical or raw materials are consumed in the process, except for mmonia for the reduction of nitrogen oxides to free nitrogen.

The catalytic process involved removes 95% of sulphur from the gases and reduces over 90% of nitrogen oxides to nitrogen gas. The sulphuric acid gives out heat when it condenses and this energy is recovered as part of he SNOX process. The process is particularly suitable, therefore, for coal with a high-sulphur content, the journal said.

-- P.T.I. Science Service, January 16-31, 1990

HORMONE MAY HELP LOWER BLOOD PRESSURE

Researchers at the Masonic Medical Research Laboratory in New York have found that a tiny amount of an immune system hormone, called interleukin-2 (IL-2), normalises high blood pressure in rats. Richard Tuttle, who directed the study, said the Food and Drug Administration approved tests of IL-2 in humans with high blood pressure.

Tuttle's team found that IL-2 reverses high blood pressure in adult rats and prevents further blood pressure increases in young rats with all stages of hypertension. Furthermore, the beneficial action of IL-2 appears permanent. Almost one year after about 100 rats received a single injection of IL-2, the animal blood pressures still have not risen, researchers said.

If the hormone treatment works in humans the way it does in rats, IL-2 could become a major factor in the control of essential hypertension, he said. IL-2 is a natural hormone produced by cells of the thymus and spleen, two key elements of the body's immune system. It has been possible only recently to use genetic engineering to produce IL-2 in large enough amounts to be used as a drug.

Synthetically produced IL-2 is being tested at very high doses in patients with AIDS and some cancer, and can cause serious side effects. But Tuttle says his experiments have used tiny amounts — from one one-thousandth to one ten-thousandth of the dose given for AIDS or cancer. At the low doses, rats behave and grow normally, he said. Similar levels of IL-2 also had no apparent effect on normal rats or even those with other forms of hypertension, researchers said.

-- P.T.I. Science Service, January 16-31, 1990

MICROBIAL TYPE CULTURE COLLECTION CENTRE

Microbial Type Culture Collection and Gene Bank (MTCC) was established in 1986 and is funded jointly by Council of Scientific and Industrial Research (CSIR) and Department of Biotechnology (DBT), Government of India. It is a well equipped modern facility housed at the Institute of Microbial Technology (IMTECH), Chandigarh. Main objectives of the collection are to act as a depository, supply authentic cultures and to provide other services to research institutions, universities and industries. At present, it has four sections, namely, actinomycetes, bacteria, fungi and yeasts. A collection of various plasmids is also being maintained at MTCC. At a later stage it will also have a section dealing with mycoplasma.

Deposit of cultures

In order to make MTCC more useful to the scientific community, researchers are encouraged to deposit cultures that are of industrial, genetic, taxonomic, biochemical, educational and of general scientific or potential economic importance.

Researchers wishing to deposit strains in MTCC should first write to the curator. Depositors are required to fill out an accession form for each strain giving relevant details. After processing of the strain by MTCC, a sample is sent to the depositor for verification by the depositor. There is no fee for the deposit of cultures for purely scientific purposes.

A depositor may request for the culture deposited or another cultures instead only once without any charge.

Supply of cultures

At present cultures are supplied in active form. Supply of cultures in freeze dried form will be introduced soon. Cultures are generally despatched by registered mail within a week after receiving an order. Cultures are not supplied to private addresses.

All orders should be addressed to the curator. At the time of ordering a culture please indicate its MTCC number, genus and species. New cultures are being added all the time. If the culture you are interested in is not listed in the catalogue please enquire about its availability. MTCC may procure it for you from other collections. A note of the reference to any publication using

MTCC strains(s) from the research worker will be highly appreciated.

Other services

Identification

MTCC plans to introduce in phased manner a service for the identification of microbes. It is advisable to contact the curator before despatching cultures for identification. Unless indicated otherwise, a culture received for identification may be kept in the collection if it is found to be of importance to MTCC.

Freeze drying

MTCC will undertake the freeze-drying of cultures for researchers who do not have this facility. Interested person should contact the curator to establish the charges and the time that will be taken to complete the work.

Educational

Trained personnel at MTCC will be glad to help select strains for teaching laboratory courses in microbiology. MTCC will also hold periodically courses on several aspects of microbial culture collection.

Strain data

Relevant information about the strains held in MTCC are computerised for easy search, analysis and retrieval. Distributed Information Centre (DIC) in collaboration with MTCC plans to create a data base on strains maintained by culture collections in India. This data base can be accessed on line through NICNET. MTCC will also be able to access strain databases maintained abroad.

Maintenance

At present all cultures are maintained by at least three methods: liquid nitrogen, freeze drying and -70°C. Fungi are also preserved under mineral oil. Viability and other characteristics of strains are periodically checked so that cultures continue to represent accurately the original deposit.

Use of the catalogue

The catalogue is divided into four sections:

Section A

Alphabetic listing of strains under four subsections, namely, actinomycetes, bacteria, fungi and yeasts. Attempts have been made to incorporate as much information as possible for each strain. Following format has been used

Genus species

MTCC Number — Alternate designation(s) of other collection(s) source of isolation, Special features and usages (Gr. Medium Gr. Temp) reference(s).

For example,

*Norcardia mediterranei *14* —ATCC 13685, Soil, Type strain, Rifamycin SV production (1 26C), Mycopath.Mycol.Appl. 13:321-330, 1960, Arch.Microbiol. 67:147-155, 1969. Type strains are also marked with an asterisk (*) before MTCC number.

Section B

Application subsection has many key words and under each key word the genus, species, MTCC number and special features and usage of the strain are mentioned. Strains listed under genetic stock are useful for genetic and molecular biological research and the marker(s) present is indicated for each. Plasmid subsection lists the host and its MTCC number, name of the plasmid marker(s), present and special feature, if any.

Section C

Composition of growth media recommended for each strain in Section A.

Section D

Numerical index of all the strains, irrespective of their taxonomic positions, held in MTCC.

For further details and orders for cultures contact: The Curator, Microbial Type Culture Collection, Institute of Microbial Technology, 1389, Sector 33C, Chandigarh 160 031. Tel.: 45108, 45004. Telex: 0395-369-IMT-IN. Cable: IMTECH.

CSIR TECH. PROCESSES ENTER WESTERN WORLD

The technological processes of th Council of Scientific and Industri Research (CSIR) has entered the wes ern world, marking a new phase in th activities of CSIR. A new ant cholesterol drug 'Gugulipid' develope by CSIR's Central Drug Research Inst tute, Lucknow, has been licensed to firm in France. Negotiations are unde way for licensing a catalyst develope by the National Chemical Laborator (NCL) to a firm in Holland. Stating th while presiding over the 25th Tanne Get-Together organised by the Centr Leather Research Institute of the CSI at Madras on Jan. 28, Dr. A.P. Mit Director-General of the CSIR, said t CSIR gifted two reverse osmosis des ination plants to Thailand last year a has received orders for 20 membran for reverse osmosis process.

Of the 20 agrochemicals develop by CSIR, 15 were in production wi annual turnover of Rs. 100 crores, said. The CSIR proposed to set up s national convention centres built arou research institutions and universiti Dr. Mitra said. The Centres would established at Delhi, Calcutta, Luckno Hyderabad, Mysore and Madras, said.

The Madras centre attached to Central Leather Research Institute a built at a cost of Rs. 60 lakhs would formally declared open soon. It ha capacity to seat 400 people. Dr. Mi said in frontier areas, new materials high temperature superconductivity been prepared and the first device w such materials — the squid — expected to be completed by Ma next.

He said the first all science satel 'Sross' expected to be launched fr Sriharikota Range by this year-end c tains a major payload from the Natic Physical Laboratory (NPL).

USING ACORNS TO CLEAN WATER

A team of Korean Scientists has recently announced a worldwide first — a process for separating heavy metals and uranium from waste water by using a derivative of the lowly acorn, the seed of an oak tree. The Korea Advanced Energy Research Institute (KAERI) reported that its researchers Chang In-Sun and Yun Myong-Gwan have discovered that "Acornic Acid" extracted from acorns can reduce the radioactivity of water contaminated by uranium to a "non-detectable" level. KAERI director Han Pil-Soon said that the new process is capable of reducing the concentration of small amounts of uranium to 0.1 parts per million (ppm). The conventional chemical treatment used in advanced countries cuts the level to only 5 ppm.

Han added that the innovative method has also proved effective in treating such heavy metals as nickel, cadmium, mercury and lead, which can harm people who consume them. The process has succeeded in cutting down the pollution level of nickel, copper, chromium, lead and potassium to below 0.2-0.5 ppm. The acornic acid extracted from 1 kilogram of acorns can treat 3.4 cubic metres of waste water, the researchers said. The net effect is a major contribution to reducing water pollution. KAERI has applied for patents in France and West Germany, and has already received a patent on the process from the United States. Some work remains. The team has not yet determined the structure of the acornic acid or how it acts on heavy metals and uranium.

BORN-AGAIN STYROFOAM

A member of the Dow Chemical group has become the first company in Japan to use an alternative to ozone depleting chlorofluorocarbons (CFCs) in the manufacture of styrofoam.

Dow Kakoh K.K. of Tokyo says that it has started producing Styrofoam, the lightweight plastic widely used for packaging, substituting a closely related but less damaging hydrochlorofluorocarbon (HCFC) for CFCs. The company is using new equipment jointly patented by itself and the US Dow Chemical Company in the manufacturing process. Production of the new Styrofoam has already started at Dow Kakoh's plant in Hokkaido; other plants will have changed to the new system by August.

ROBOT HANDLER FOR MEDICAL LABS

A new robot developed by a British company could prove a boon to medical laboratories involved in diagnostic tests. The device has particular application to work on diseases such as AIDS, where technicians risk infection from blood samples. The robot has been designed to handle samples automatically, so reducing the chance of accidents.

Known as Autolab, the robot will perform a wide variety of manipulative and liquid-sample processing tasks. These include 16 operations that can be performed without human intervention, such as preparation of samples at the start of a test, placing them in an incubator and reading the results after their automatic removal.

The robot can swing through 270 degrees to carry out its tasks. The tools it requires to carry out a particular procedure are within this area, and it picks out the appropriate ones by following instructions preset in its software. In this way it can make use of such implements as tube and plate grippers. Plate washers and lid handlers. The Autolab, developed by Kemble Instruments in collaboration with experts at London's Charing Cross Hospital, can also interact with surrounding equipment; this allows it on instruction to transfer samples to and from peripheral devices.

NEW VICTORY FOR OZONE

The development of safe alternative to chlorofluorocarbons (CFCs), th chemicals held partly responsible fo depleting the ozone layer over th world's polar regions, continues apace Now British scientists have develope a new aerosol propellant system usin CFC substitutes that costs the same an performs just as well as aerosols base on CFCs. Successful trials of the nev system using four different types of pro pellant were concluded recently at Brit ish Petroleum Interntional's researc centre at Sunbury, near London. Th company plans to use the new aerosol initially for applications within the o industry, such as maintenance fluids an silicone release agents; but the syste can be readily adapted to a vast rang of consumer and other products in ae osol packs. "The scientists at Sunbur have achieved a real breakthrough" says Gus Reid, the internation research and development coordinat for BP oil. "We have a multi-millio pound-market in prospect".

The advance was achieved by Ia Callaghan and Ian Shurbb of Sunbury colloid science branch, which studi particles in suspension. "We realise that we had the right technology to sol the chemical side of the equation, b were deficient in engineering ski relating to the design of aerosol noz les, which required modification", sa Callaghan, "so we entered a joint eff with a Swiss firm which has experien in aerosols that are propelled by con pressed gas".

How does the new aerosol syst work? Beyond claiming that it is ligh than existing CFC systems, easier handle and able to work at any ang BP is not prepared to say; neither i yet ready to name the four alternati propellants that were successfully test with new system. The company is, ho ever, promising to release more det in the near future.

New Products

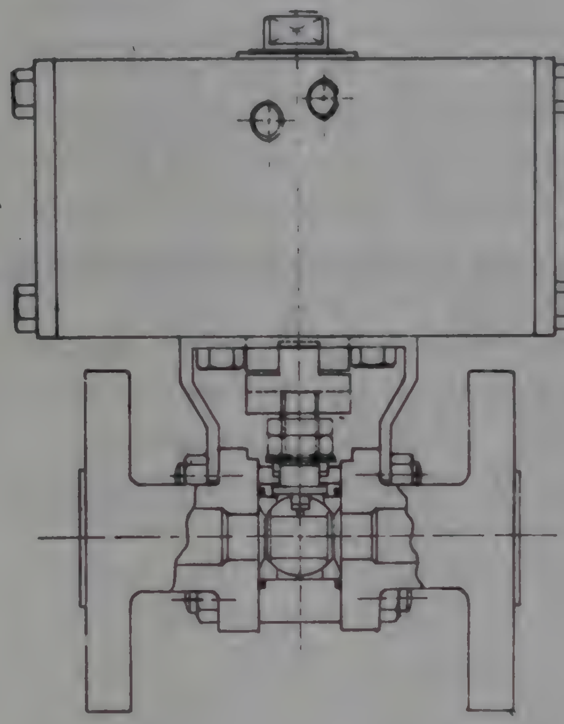
ACTUATOR OPERATED VALVES

Flocon Systems (P) Ltd., manufactures highly reliable pneumatic rotary actuators to fit on a full range of ball, butterfly, plug valves, Damper/Louvers and other application where upto 90° rotory torque is required for power operation and remote control. Flocon actuators are direct mounted type on shaft of valves and are designed with performance, simplicity and cost in mind. These are dual piston design for compactness, high torque, minimal air consumption and even weight distribution on the valve shaft. The torque generated through a rack and pinion gear mechanism extends uninterrupted torque level, actuator life and eliminates backlash or hysteresses. Actuators have extended shaft for position indication and manual, override capability.

"FLOCON"'S' compact double piston designs develops high torque output from a short stroke. Plant air from a single connection is valved through ports into inner and outer chambers alternately. Both pistons thus provide for both opening and closing actions. In a double acting actuator air enters the centre chamber to push the pistons apart opening the valve. When closing the valve the actuator moves on air supplied on the outside of each piston to push the piston together again. The actuators are available in various sizes ranging in torque output at 80psi from 208LB-inch upto 13,000 lb-in using air or natural gas upto 120 psi maximum working pressure.

"FLOCON" power actuation provides many advantages both economical and technical. Control of a valve of a group of valves from remote location, operation of valves located in inaccessible positions, Automatic and sequential valve operations in process plants, Emergency, shut downs, safety operations etc. can be carried with solenoid valves and limit switches.

Flocon actuator operated valves find application in chemical and petro chemical industries, oil handling sectors paper and sugar mills, breweries, dairies, food industries, pharmaceuticals, tanneries, oil platforms, hospitals & hotels, thermal & nuclear power stations, water treatment plants, airconditioned buildings, Engineering companies.



ACTUATOR OPERATED VALVE

For more details contact: Flocon Systems (P) Ltd., G-51, Plot 1949, 1st Street, Annanagar, Madras-600 040. Phone:618234. Telex: 041-24060 PCO IN WDT 031.

SINGLE CRYSTAL MgO SUBSTRATES

Substrates are small thin pieces of single crystal, polished on one or both sides, which are used as a base for layering high temperature superconducting ceramic. It is estimated that more than 1000 laboratories in universities and Industry all over the world are now doing serious work on high temperature superconducting ceramics.

MgO appears to be the substrate of choice of ceramic superconductors, and it seems that a great deal of R&D will be necessary before high temperature superconductors are ready to leave the laboratory. Each laboratory working on high temperature superconductors needs a continuous supply of substrates.

Single crystal fused 99.9% MgO produced at Dead Sea Periclase Limited is cut and polished by Xserius Superconductivity Inc. of Jerusalem, expoerts who themselves do research work on high temperature superconducting ceramics.

Dead Sea Periclase Limited have therefore complete control of the manufacturing process, beginning with the rich brine of the Dead Sea and ending with the final polishing of the substrates in Jerusalem.

The standared size substrate is 10 x 10 x 0.5mm, polished on one side. Other sizes are available — please enquire.

Substrates come individually packaged: wrapped in a tissue in a plastic envelope. Shipment is by airmail.

For further details, please contact: Kailash Marketing Associates, 1, Sriniketan, 14th Road, Chembur, Bombay-400 071.

ASBESTOS-FREE FRICTION PRODUCTS FROM UK FIVE TIMES STRONGER THAN STEEL

A secret man-made fibre claimed to be five times stronger than steel is used by a visiting British company for an extensive range of friction products for the automotive trades and other industrial applications.

Mintex Don, the 100-year-old company whose asbestos-free products are the outcome of a five-year research programme, will take part in the trade mission to India organised by the British and South Asian Trade Association. The firm's Regional Export Director, Mr. Ron Barratt, who will represent the

company, said that for all its brake and clutch linings it was using the material which had a 40 per cent longer life than asbestos. Mr. Barratt will also promote the company's other products which include clutch spare parts, brake discs, fan belts, brake and clutch fluids and brake accessories used by automative manufacturers and the railway and ship-building industries.

(Minitex Don Ltd., P.O. Box 18, Cleckheaton, West Yorkshire, England BD19 3 UJ)

AUTOMATIC PUMP CONTROLLER

Eprom Incorporation offers a wide range of water liquid level controller required for automatic on/off of all types of pump sets. The design of Eprom controller is based upon latest IC technology. Water/liquid level is sensed by magnetic probes which do not require periodical cleaning or servicing. Pump will start automatically at low level and stop at high level for overhead tank. For ground tank it will stop at low level and start at high level.

In domestic sector, Eprom controller can be used for private bungalows, co-operative societies, commercial centres, government offices, hotels, hospitals, housing colony, municipal, railway public water works and ESR systems, tube/bore wells sewage system, automatic storm water draining systems. etc. For details contact: Eprom Incorporation, 4B, Akash Building, Ashok Road, Kandivli (East), Bombay-400 101.

PNEUMATIC CONVEYING SYSTEM

Indiana which till date was offering only mechanical conveying systems is now geared up to undertake all types of projects for pneumatic conveying systems. The system using suction or pressure offers many benefits including multiple feed and delivery operations, easily controllable equipments, controlled feed rates, conveying pipe at any angle and through congested areas, saves space, can be easily extended to handle increased production, can be easily extended to handle increased production, can be fully automatic, provides a safe contamination free environment, easily maintained and above all is cost effective and above all is cost effective.

Indiana's pneumatic conveying sys tem maximises the outstanding advan age of this technique i.e., its efficienc

The company is in a position supply positive, negative and combine positive-negative pressure conveyin systems. Continuous positive pressu conveying systems are suitable f applications where the material has be picked up from one point and distrib uted to various places.

This system utilised a rotary valve act as an air seal and to introduce th product in a controlled manner into th conveying line. Advantages of such sy tems are low cost, flexibility and abili to convey material at high tonnage ra over long distances.

Continuous negative pressure or su tion conveying system is suitable f applications where material has to picked from several sources and deli ered to a single source. This system dust free in operation.

For details contact: Indiana Eng Works (Bombay) Pvt. Ltd., 12, Hing rani House, Dr. Annie Besant Roa Worli, Bombay-400-018.

NORGANIC CHEMICALS PROFILE

Mineral barytes — (Heavy Spar)

India ranks among the few countries in the world gifted with rich mineral resources. Barytes is one such mineral. This material is also known as heavy spar. Chemically it is $BaSO_4$ (barium sulphate). Almost 80/90% of world output of this mineral is used in oil well drilling. The average quantity of barytes used per 1000 feet of drilled well hole was of the order of 9 tonnes during 1978-80. At present it is around 11 tonne per 1000 ft. of drilled well hole. The ground mineral is used to increase the density of the drilling mud an aqueous suspension of clay with other additives. The mud enables it to serve as a plaster for the wall of the drilled hole and prevent it from caving in. Mud density is increased by the addition of ground barytes, which allows faster discharge of cuttings and helps to restrain the high oil and gas pressure and thus preventing the blow-outs.

The optimum particle size distribution for a drilling mud pigment generally runs between 2 and 44 um. API (American Petroleum Institute) specifies the following for the ground barytes:

1. Min. sp. gravity 4.2.
2. Max: 250 ppm of soluble calcium.
3. Average particle size 44 um.
4. Residue on 325 mesh sieve should be less than 5%.

Particles larger than 44 um are difficult to keep in suspension. Particles less than 2 um tend to increase viscosity of mud and hence induce "gelation" of the drilling composition.

80% of this mineral in India is located in A.P. In India the total deposits are estimated to be 34 million tonnes. The mineral occurs in the earth in hydrothermal veins and sedimentary deposits and is usually mined in open cuts and pits.

Barytes deposit location in A.P.

Some of the few locations where deposits are found are: Betam Cherla in Kurnool district, Pullivendla in Cuddappa district, Kottapalli in Anantapur district, many places in Tadpatri taluk, Khammam district at a number of locations.

In Salem district of Tamil Nadu and in Alwar (Rajasthan) there are barytes deposits. Koduru, Kollapur, Mangampeta, Garla (near Dornakal), Razampeta, Tadapatri, Cuddappa are some of the few locations where good quantity of quality barytes are mined and exported.

Some properties/characteristics of the mineral

The mineral barytes is resistant to inorganic acids. But dissolves slowly in hot concentrated sulphuric acid and in molten alkali salts.

One can find this mineral in various colours and forms the snow white, the dull white, light pink coloured, light and dark greyish, yellowish, straw coloured etc. with or without the characteristic shine and the crystal structure and shape. Silica is often found with the mineral, in India, and the more the silica in the mineral the greater the difficulty to crush and grind the barytes. Lead as galena is also seen embedded in the mineral with its characteristic golden yellow shine and lustre. Calcium and strontium — the other members of the barium family known as alkaline earth group of metals — are present in very small amounts only in the Indian barytes. Iron, aluminium (as their oxides), manganese are also seen present in the mineral. (Grey coloured barytes).

Barytes beneficiation

Barytes of assay less than 85%, are presently wasted in India, though they can be beneficiated to 92/94% from as low percentage of 60/65%. Even though no serious efforts and attempts have been made in India for the enrichment of low grade barytes, abroad such beneficiation plants are working. For example, one can find in Romania and Poland, such enrichment plants running at rated capacities of 100 tpd to 500 tpd, using 60-65% barytes and enriching to 92/94% $BaSO_4$. Flow sheet of a typical Romanian installation for the beneficiation of 60/65% $BaSO_4$ to 92/94% is given.

Some of the beneficiation methods are briefed below:

In case of high silica content in the barytes, crushing the ore in one or two stages followed by screening and fine grinding with or without classification enriches $BaSO_4$ leaving the silica uncrushed. Silica normally does not get ground, and this advantage is taken. When barytes, having high silica is ground in ball mills of slow speed - one can find balls of silica getting accumulated inside the mill. Here the beneficiation is taking place in the ball mill. If there is high degree of intergrowth of quartz and the ore has more iron, lead, zinc, wet mineral dressing followed by floatation is required. The ore is ground to 0.10 mm average size before the floatation. Sodium oleate, tall oil, oleic acid, and recently alkyl sulphonates and sulphates have been used as collectors. Water glas is preferred as deppressant for quartz and Fe_2O_3.

Another method, uses the tendency of the mineral baryte to decripitate on heating. Here the broken ore is heated t 700-750°C in rotary kilns. Pure barytes crystals bursting whil the gangue is unaffected. The decripitated fines are screene finally.

Bleaching the ore

Acid treatment of granular ore in bleaching vats, remove iron, manganese etc. followed by washing and drying. Th ore is further dry milled in ball mills. Acid treatment in th presence of reducing agents or oxidising agents are also use for certain ores.

The ore dissolves in molten sodium chloride, leaving a the other impurities insoluble and allowed to collect at th bottom. Supernatent layer containing the pure $BaSO_4$ dis solved in the salt, is quenched in water, where in the pur form of $BaSO_4$ separates out since it is not soluble in wate This method is quite expensive, but will give $BaSO_4$ of 98 and above purity.

Manufacture of barium compounds

For the manufacture of barium compounds the baryt should have $BaSO_4 > 95\%$ and much less silica, Fe and Al_2O_3. India barytes have traces of calcium an strontium only.

Pigment grade barytes

Mainly four grades of pigment grad barytes are detailed below:

1. **20 Mesh - Coarsely ground baryt**
   Use mainly in the glass industry.

2. **Unbleached finely ground (-3 Mesh)**
   Used in formulation of oil well slu ries and drilling mud.

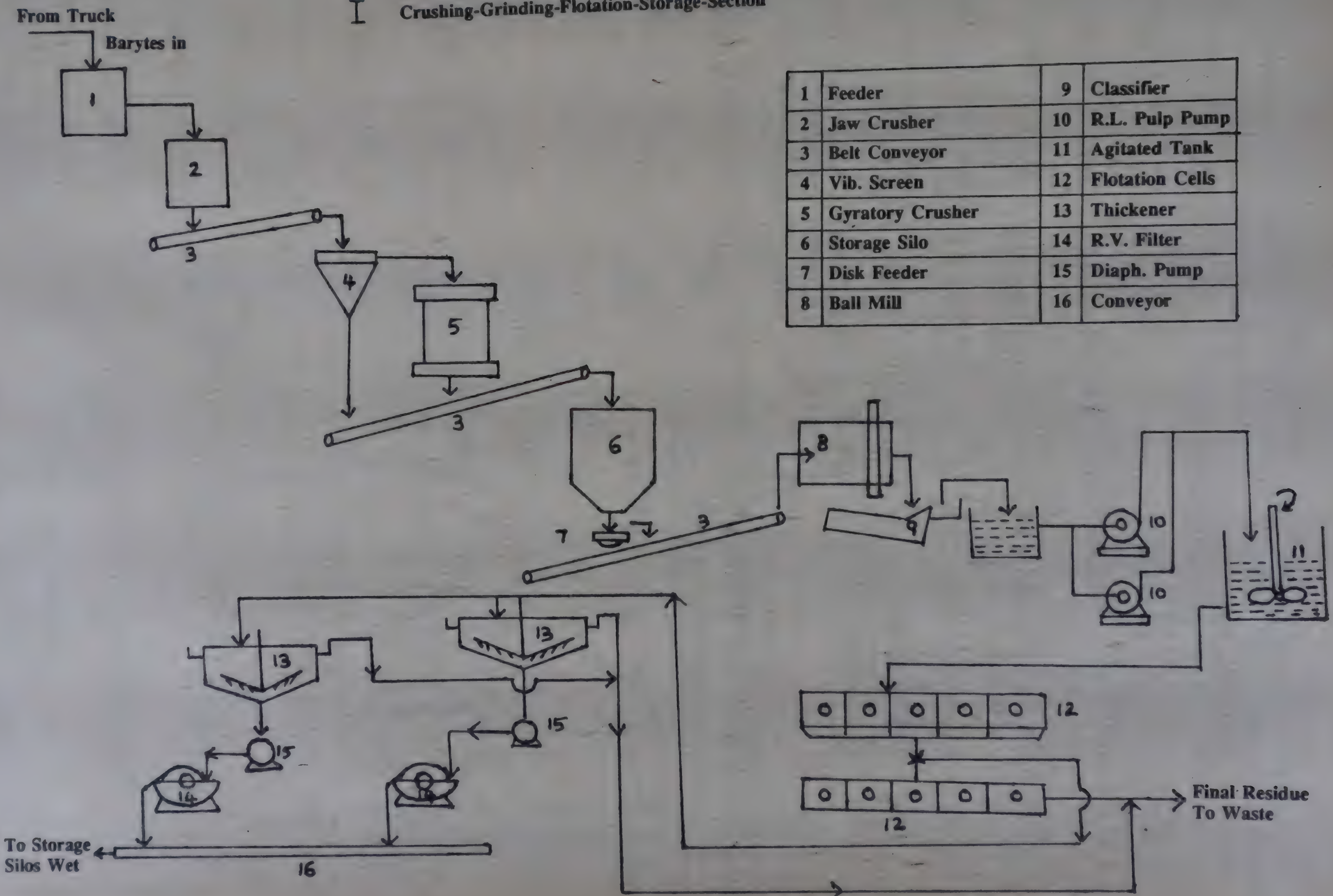
3. **Finely ground, bleached (-3 Mesh)**
   Used in paint industries, as extend and diluent in coloured pigments

4. **Micronised bleached barytes**
   This has the finest particle size pigment. Produced by micronisati of bleached - 325 Mesh barytes.

A brief description of typical baryt

Barytes Beneficiation

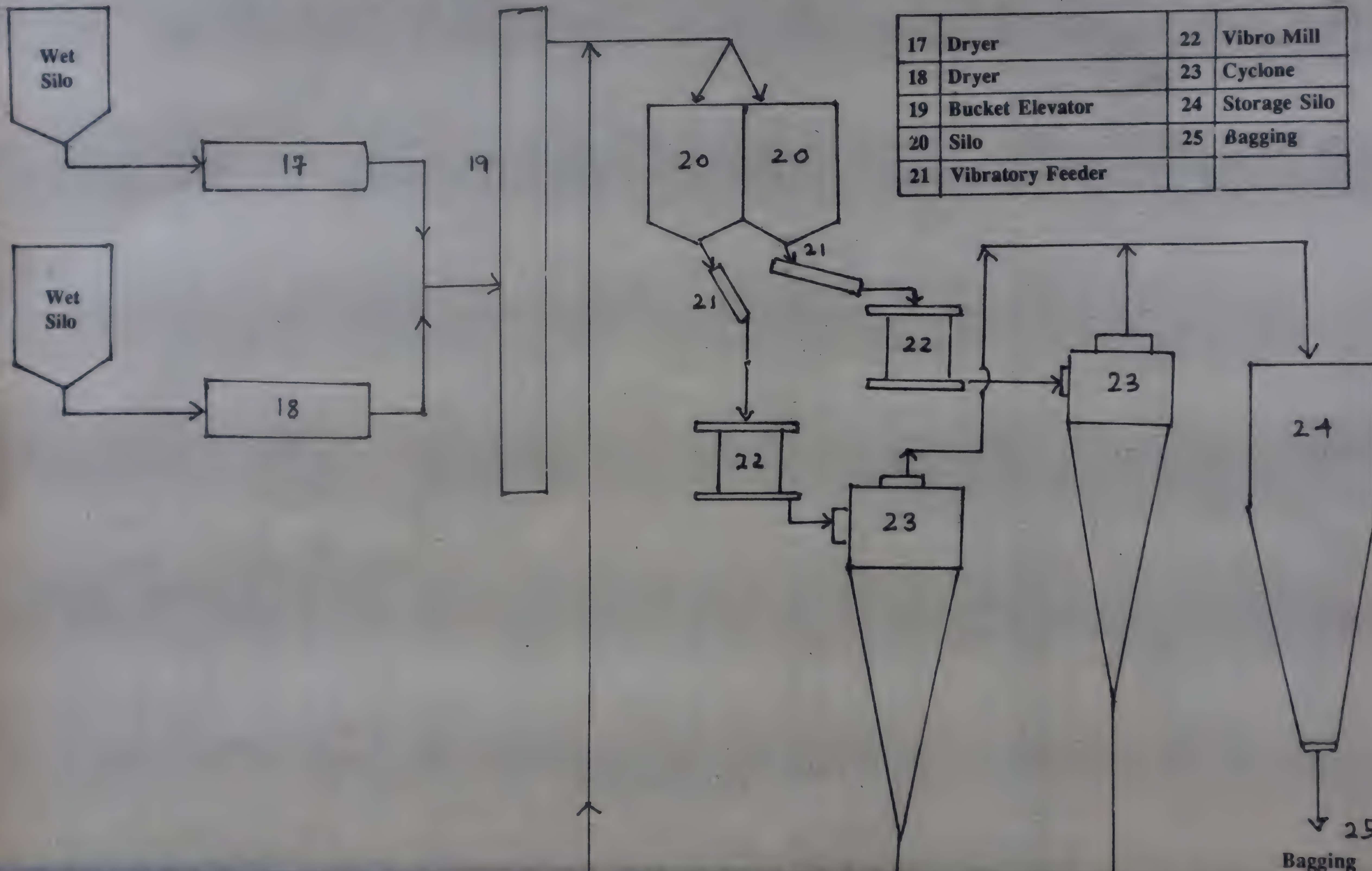
I Crushing-Grinding-Flotation-Storage-Section



1	Feeder	9	Classifier
2	Jaw Crusher	10	R.L. Pulp Pump
3	Belt Conveyor	11	Agitated Tank
4	Vib. Screen	12	Flotation Cells
5	Gyratory Crusher	13	Thickener
6	Storage Silo	14	R.V. Filter
7	Disk Feeder	15	Diaph. Pump
8	Ball Mill	16	Conveyor

Barytes-Beneficiation

II Drying-Micronising-Packing Section



17	Dryer	22	Vibro Mill
18	Dryer	23	Cyclone
19	Bucket Elevator	24	Storage Silo
20	Silo	25	Bagging
21	Vibratory Feeder		

nriching plant running in Bucharest of Romania is given.

Capacity is 250 tonne/day of baryte ore of the following analysis: (See flow sheets)

$BaSO_4$ - 60-65%
Silica (SiO_2) - 25-30%
Iron and other oxide - 2-3%

After the enrichment an output of 150 tonne/day of baryte enriched to minimum of 92% and having a fineness of 300 mesh. Ore from the mining site is fed to a jaw crusher, followed by sieving of this primary crushed ore. The overflow from this screen is fed to gyratory crushers where it is crushed down to a size of 0-20 millimetre. Mixture of this and the under flow of the screen from primary jaw crusher is conveyed to a silo for storing.

Through a suitable feeder this 0-20mm size ore is fed to a ball mill (2400 - 2500 size), which is working in closed circuit with a double cone classifier, thus assuring a grinding fineness of 60% < 0.075 mm.

After the grinding, the pulp goes to a circuit of flotation cells by pumps. Each floatation cell of the total of 18 cells, has a size of 3.0 m³. Dirt from the flotation cells (silica + iron) is sent to a mud pond. The concentrate obtained is transported to thickeners.

Under glow from the thickener is filtered through rotary vac. filters (30-40 m² surface area), giving wet cake of enriched baryte of 92 per cent with 16 to 18 per cent moisture, and is dried to reduce moisture to 2 per cent. Dried concentrate is sent to silos. From the silos it is sent to the micronising station. Final product is around 300 mesh.

Costing of mined barytes

At the prevailing labour cost, and other costs, cost of mined barytes at pit head works to Rs. 250/tonne on a 400 tpm output.

Chemical News From Abroad

ROCHE BOOSTS DIAGNOSTICS

Swiss Pharmaceutical company Hoffmann-La Roche has given a boost to its diagnostics activities with the acquisition of 90 per cent of the French company ABX. ABX focusses on the development and production of analytical systems and reagents for automatic blood cell analysis and counting. It recorded sales of around FF140m ($24.2m) in 1989.

According to Roche, the acquisition fills a gap in its diagnostics division, where it has so far mainly been active in clinical chemistry, immunology and microbiology. In future, the centre for Roche's haematological activities will be located at ABX's development and production site at Montpellier.

EC STATES SIGN ELECTRICITY DEAL

An agreement has been signed between the electricity utilities of France, Spain and Portugal concerning the transit through Spain of electricity from France to Portugal. The deal is a step forward towards the free transit of electricity in the EC within the framework of a single energy market in 1993.

The European commission approved a series of measures in July 1989 aimed at creating a unified energy market in Europe. The measures were designed to facilitate cross-border exchanges of electricity and gas, even if a third member state must also be crossed.

The tripartite agreement, signed in December last, between France's EdF, Spain's Redesa and Portugal's EdP, lays down the transit dues to be paid to Spain for the delivery of some 300 MW/year of electricity by EdF to Portugal from 1994-99. No details were available on the deal, which could be extended a further five years after 1999. Spain has been balking at allowing the transit of EdF's electricity through its territory as it wishes to sell its own electricity to Portugal. France, however, has been fighting for free transit principle to be adopted as it is keen to export EdF's surplus nuclear power.

Meanwhile, industrial electricity users in the UK may face price rises of 5 percentage points above the retail price index when the new rates come into force in April. High-level energy consumers such as the chemical industry will be the worst hit.

ORKEM SPLIT CAUSES FINANCIAL QUERIES

The restructuring of the French state chemicals industry is posing a number of financial problems. Transferring some of Orkem's assets to Total CFP, which is only 34 per cent state owned, will increase the state's participation in the oil group, conflicting with president Mitterand's credo of "no nationalisation - no denationalisation".

A financial arrangement is being worked out at present whereby the FF7bn ($1.2bn) worth of assets which Total will receive from Orkem will be partly bought up directly by Total and partly by state-owned banking and insurance groups, including Union des Assurances de Paris, Banque Nationale de Paris and GAN.

Total will provide FF1bn from its own funds and borrow FF4bn from the state, which will be consolidated through subsequent capital increases. A capital increase is also being considered for Elf. With Orkem's assets, the state's share in Elf will also increase but should be brought back to 55%, possibly even 51%, with the capital increase.

ICI AND DYNO GAIN HOLD IN *US* EXPLOSIVES MARKET

Competition continues to increase in the US commercial explosives market with many new entrants, including ICI and Dyno Industrier, taking their place in a sector believed to account for 25 per cent of the $4bn world market.

In a move to strengthen its position as one of the world's top suppliers o commercial explosives, ICI is to pur chase US-based Atlas Powder Com pany from industrial products grou Tyler for $193m. The deal, subject t the approval of US regulatory author ities, is currently being considered an a decision should be made over the nex few months, said an ICI spokesman.

Market observers say ICI has bee trying to gain a foothold in the U explosives market for the past 17 years The move is an opportunity for it t renew its partnership with Atlas Powde which was part of the UK company fo a short spell in the early 1970s.

ICI was forced to sell Atlas to Tyle by the Federal Trade Commissio because of fears that it could gain to strong a hold on the North America market.

An ICI spokesman said: "Toda there is a different view held by U companies than there was back in th 1970s when we were trying to gain foothold in the market. We are no longe seen as a foreign company as more tha 10 per cent of ICI is owned by the US."

ICI recognises the benefits of gain ing a geographical position in the U explosives market and says this pu chase will benefit both its productio and distribution network. It has a lead ing position in the Canadian explosive business and has established its inter national base in Toronto.

It also has explosives businesses i Europe, Australia, Asia Pacific, Afric and Latin America. Worldwide sales f the overall explosives business totalle $655m in 1989 and it reported a trac ing profit of $85m.

However, ICI's UK explosives bu siness is currently facing six charge brought by the Health and Safety Exe utive following an accident in Mar 1989, when an ICI vehicle explode causing one death.

Meanwhile, Dyno Industrier h recently acquired two explosives di tributors in the US. The two companie Piedmont Explosives and Southeaste Energy, have a turnover of more th $20m. Dyno, through its American su

diary, Ireco, is believed to be the leadng supplier of commercial explosives n the US.

It will purchase 50 per cent of Piednont Explosives and 100 per cent of outheastern Energy. These acquisitions vill give it a position in North and outh Carolina, Virginia, Georgia and ennesse.

Commenting on the prospects for the JS explosives market, one analyst said he market looked good and reasonable rofits were expected. He added that the xplosives market was much more table than for chemicals and not prone o seasonal cycles.

E & E CONTINUES ACQUISITION TRAIL

Ellis & Everard had announced a 4.5m ($7.4m) acquisition of the Peter eekie Group, the UK distributor of wimming pool equipment.

Payment will comprise £1m in cash nd the balance in shares. A further consideration of a maximum of £3.5m will be paid depending on profits over the next two years.

Stephen Bentley, Ellis & Everard's finance director, says the move enables the company to broaden its product range and prepare for future European opportunities.

Meanwhile, continuing its policy of progressive expansion, it is currently looking at possibilities for purchases in the UK, US and continental Europe. It is especially keen to develop its geographical base in the US, where it distributes commodity chemicals, and its position in the European speciality chemicals market, said a company spokesman.

The announcement follows the company's interim results.

KABI UPS PRESENCE IN NORDIC MARKET

Procordia-owned Kabi is to purchase a drug manufacturing plant in Halden. Norway, from US pharmaceutical company Baxter for an undisclosed sum. According to the agreement Kabi will also acquire stock held by the Norwegian company Baxter A/S. Through the agreement Kabi hopes to strengthen its position in the Nordic market and develop its range of products.

Baxter, which reported sales in 1988 at around $7bn, has plans to invest around $1bn in research and development over a four year period. It markets more than 120,000 products and has manufacturing facilities in over 20 countries.

Meanwhile, Kabi has signed an agreement with the Dutch pharmaceuticals company, Generics Group, for control of marketing rights to its generic products.

At the same time Kabi will establish generic drug companies in Sweden, Denmark, and Finland. In two to three years the companies are expected to have total sales of around Skr50m/year ($8.07m).

News about New Projects

U PONT PLANS $1 BN NYLON IVESTMENT IN ASIA PACIFIC

Du Pont has announced plans to end $1bn over the next ten years to iild plants for nylon (polyamide) termediates and downstream units in e Asia Pacific region. The first part of is investment has been dedicated to a 200m adipic acid plant to be built in ngapore.

Initial capacity of the plant is set at 00,000 ton/year, with completion heduled for 1993. N.K. Ferguson Co., subsidiary of Morrison-Knudson of oise, Idaho, has been selected as igineering contractor and expects to eak ground later this year.

Du Pont will use its own technology produce Adi-Pure high purity adipic id. The company says Adi-Pure which as introduced in 1988, is a highly constent dibasic acid with significantly duced nitrogen content. Du Pont's two lipic acid plants in the US, at Sabine nd Victoria, Texas, have already been nverted to this technology, and the mpany's Maitland, Nova Scotia, anada, plant will be converted in 1991. his new plant is Du Pont's first adipic id plant outside North America and ill bring the company's worldwide ipacity to more than 700,000 ton/year.

Also in Singapore, another $100m as been dedicated to a polymerisation lant already under construction, due to e started up in 1993. This unit will pport compounding plants in Korea, ipan and Singapore. The Japanese lant is already on stream, the Korean cility is under construction and the ingaporean project is in the planning ages.

In the longer term, Du Pont plans to onstruct a world-scale nylon intermediates plant. Production of adiponitrile nd hexamethylenediamine is scheduled or the late 1990s. The aim of these investments is to position Du Pont as a major nylon 6,6 and intermediates supplier in the Asia Pacific region in the 1990s. Product will be destined initially for the local market but will be deployed to other parts of the world as needed.

NESTE EXPANDS ADHESIVE RESINS

Demand from the chipboard industry has prompted Neste, the Finnish oil-to-chemicals concern, to extend the geographical span of its adhesive resins production. A new plant is due on stream next summer in Belgium and another is planned on the Malaysian island of Borneo. These will complement the existing capacity in the US and Finland.

Construction of the Belgian plant, approved by the Neste board last summer, is starting now at Ghent. The initial capacity will be 50,000 ton/year when phase one comes on stream in mid-1990. No decision has been made on the timing of a second phase which would double the capacity.

The timber resources of Borneo have prompted Neste to consider a similar plant there. It is mulling a $20-30m investment and is currently talking to prospective local partners. A plant of 50-70,000 ton/year is likely, though the location is yet to be finalised. A decision on the project is expected by the middle of this summer. Neste is expected to have a minority stake in the venture. Both the Belgian and Malaysian plants will be based on Neste's proprietary technology — a closed system process unlikely to pose any environmental problems.

SUEZ EXPANSION

Societe El Nasr d'Engrais & Industries Chimiques (Semadco) is planning an ammonium nitrate plant at Suez, where expansion of an ammonia plant is underway. A financial study of the project should be complete shortly. Start-up is scheduled for 1992/1993.

Technip of France and Ammonia Casale of Switzerland are contractors for the 133,000 ton/year ammonia revamp which should come on stream in 1992.

CLOROETIL MAKES BRAZILIAN BID

There is a new contender in the race to build a methanol/acetic acid plant in Sergipe state, Brazil. Cloroetil, a joint venture between Fam of Brazil and Shell, has submitted a $520m tender to the Industrial Development Secretariat for an integrated project to produce 250,000 ton/year methanol and 420,000 ton/year acetic acid. Cloroetil's project manager, Jorge Saraiva, said Norquisa and Petroquisa would be partners in the project.

Methanol technology is likely to be based on ICI, and for acetic acid Monsanto is believed to be near to agreement to supply a process based on the carbonylation of methanol. The new proposal is planned in two stages, the first costing $400m to erect the methanol unit and 240,000 ton acetic acid, and the second to invest $120m for an additional 180,000 ton acetic acid.

QAFCO STILL KEEN ON THIRD PROJECT

Qatar Fertiliser Co. (Qafco), 75 per cent owned by Qatar General Petroleum Corp. and 25 per cent by Norsk Hydro, is still hoping to go ahead with a third ammonia/urea project at Umm Said, despite discouraging indications for an export-oriented ammonia project.

A Norsk Hydro spokesman said the project depended on the price of ammonia and whether Qatar's North gas field would be opened up to supply the necessary feedstock. "If everything is formally decided, Qafco could begin

construction in 1992 at the earliest, for 1993-94 start-up", he said. The main market would be the Far East. Plans are for a 495,000 ton/year ammonia plant and 600,000 ton/year urea facility, costing around $300m. A Qafco spokesman was more positive about the project, and said board approval had been given for a detailed feasibility study.

ATOCHEM BUILDS FIRST HTPB PLANT

Elf Aquitaine's chemical subsidiary Atochem is to build its first European plant to manufacture hydroxyl terminated polybutadiene resins (HTPB). The FF200m ($35m) plant at Laveera will have an initial capacity of 4,000 ton/-year which could easily be doubled if demand dictates. Using butadiene feedstock from the same site, it is due to start up at the beginning of July 1991.

The unit's main product will be Poly BD R 45HT, a component of solid rocket propellants. Besides space industry applications, HTPB is used in double glazing mastic, sealants and coatings for steel and concrete, varnishes for electronic components and telecommunication encapsulants.

JAPANESE PLAN PP

Idemitsu Petrochemical and Mitsubishi Petrochemical have given details of their planned PP expansions. Idemitsu Petrochemical is to use BASF's gas phase polypropylene technology in a new plant in Chiba, Japan. The plant will initially produce 50,000 ton/year PP but will be built with expansion possibilities in mind. Basic engineering is already underway by Uhde and the anticipated on-stream date is the end of 1991.

Mitsubishi Petrochemical has licensed Unipol technology, jointly developed by Union Carbide and Shell, for its polypropylene plant at Kashima, Japan. The 80,000 ton/year plant will be on-stream in 1992.

At the same time Union Carbide has acquired an option to obtain a licence and sub-licensing rights for the use of Mitsubishi's new family of high activity PP catalysts.

US FIRMS GO AHEAD WITH TITANIUM DIOXIDE UNITS

US company Kerr-McGee's new $120m titanium dioxide plant, announced in December 1989, is to be a domestic facility, probably in the south east, said a company spokesman. Plans call for a 60,000 ton/year unit, using Kerr-McGee's chloride process, to start up in 1992/93.

A decision on exact location is expected by the end of March. The company already produces TiO_2 in the south east at Hamilton, Mississippi. The plant there was expanded from 85,000 ton to 106,000 ton/year last summer. There is also talk of some TiO_2 plans at Mobile, Alabama, where the company already produces synthetic rutile.

Meanwhile, the major hurdle in Du Pont's sustained attempts to build a titanium dioxide plant in South Korea has been cleared. It has government approval for the plant — a joint venture with local firm Hanyang Chemical.

The government's foreign capital project deliberation committee will meet shortly to give the final sanction, regarded as a formality. Du Pont will have an 80 per cent share in the venture and Hanyang Chemical will hold the remainder.

The project was first put forward in 1986, but rejected on environmental grounds. The $150m plan now accepted is for a 65,000 ton/year plant, using Du Pont's chloride-route technology and due on stream in late 1993/early 1994.

Du Pont still has to sort out a location. It will be collaborating with its partner and the Korean government on this. The joint venture must also be officially incorporated, involving exchange of letters of incorporation between the partners. Contractors will be evaluated once a site is chosen. Hanyang has plants at Yochon, Ulsan, Chinhae and Kunsan.

Last year Du Pont received approval for a titanium dioxide plant of the same size and cost and using the same technology to be built at Kuan Yin in Taiwan. Construction of this will start in the second quarter this year.

BANKS SIGN UP FOR SOVBUTITAL

Morgan Grenfell, Moscow Narodny Bank and San Paolo Bank have signed a finance agreement worth DM140bn ($246m) for the Soviet/Italian joint venture, Sovbutital.

The venture which comprises Italy's Pressindustria, the Tobolsk Petrochemical Kombinat of Siberia and the USSR's Neftechimbank, will produce 90,000 ton/year butyl, chlorobutyl and bromobutyl rubber at Tobolsk, USSR from 1993.

Sovbutital has a total investment of over DM700m, of which Pressindustria has subscribed 30 per cent. The facility is the largest convertible currency financing for an onshore joint venture in the USSR. Sovbutital will be the third world producer of these butyl rubbers after Exxon and Polysar.

The venture expects an annual turnover of over DM360m, and will place a third of its output on the international markets, through a London-based Pressindustria company, Rubber and Chemicals Ltd. The world market for such products is estimated at more than 600,000 ton/year.

Pressindustria will supply the licences, design, technical assistance and all equipment to be purchased outside the USSR. Raw materials will be sourced almost exclusively from Tobolsk.

INDONESIA PLANS UREA PROJECTS

Two state-owned Indonesian companies plan to build urea fertiliser plants this year. PT Pupuk Kujang is to build a 570,000 ton/year urea and 330,000 ton/year ammonia plant at its existing site in Western Java, said the company's president, Wardijasa. "The project will cost $250m, of which 40% will be financed by this company and the remaining 60% by private companies."

The second project, involving PT Petrokimia Gresik, plans units producing 460,000 ton/yr. urea and 330,000 ton/yr. ammonia at Surabaya, Eastern Java. "This will make Petrokimia Gresik the most diversified fertiliser company in Indonesia", said company president, Sjafarudding Sabar. Indonesia's six state-owned fertiliser firms, which also participate in joint ventures with other Southeast Asian countries, have a total annual urea capacity of 4.94m ton.

STATOIL AWAITS METHANOL STUDY

A decision on the feasibility of Statoil building a methanol plant in Norway should be reached by this summer. The Norwegian oil-to-chemicals major, set up a working group before Christmas with partner Norske Conoco to assess the project which would be based on natural gas from the Heidrun oil field. A separate Statoil working party is studying the feasibility of an MTBE plant, which would use methanol as feedstock. "If we decide methanol is a goer in both technical and commercial terms, a decision to build an MTBE plant will probably follow within the year", said a Statoil spokesman. The location of the MTBE facility has not been chosen. It is likely that it will be outside Norway, nearer to the product's market base.

The Norwegian parliament is to assess the plans for the development of the Heidrun field in its spring session. Doubts have been raised in the Norwegian press that the proposed time-frame of the field going into production in '95 is optimistic. Under current proposals Conoco will develop the field and Statoil will take over when it goes into production. The methanol plant could be commissioned as early as 1996, though a spokesman was less specific: "By the end of the century we should have a methanol plant using the gas".

OLIN EXPANDS

Olin Corp of Stamford, Connecticut, is expanding its speciality polyether polyol facility at Brandenburg, Kentucky. The expansion is due for completion during the first quarter of the year and is regarded by Olin as a "significant increase in our ability to manufacture polyols". The plant uses Olin's proprietary technology. A spokesman said the increased capacity was designed to meet growing customer needs for speciality polyols, serving the adhesives, coatings, elastomers and sealants markets.

News from Japan

JAPAN'S CRUDE OIL IMPORTS RISE 27% IN OCTOBER

Japan's crude oil imports in October rose 27% from a year before to 18.45 million kl, helped by growing industrial and private consumption, according to preliminary data issued by the Ministry of International Trade and Industry (MITI). The rise partly reflected the fact that importers wanted to take advantage of low prices of crude oil during the month, a ministry official said.

Brisk gasoline consumption in line with increased purchases of luxury automobiles, combined with rising industrial demand for electricity, also contributed to raising imports of crude oil as a whole, the official said.

The percentage rise in crude oil imports from the previous month was comparatively low, however, at 17.7%, due to the fact that some importers refrained from purchasing oil in expectation that prices of crude oil would fall further in the coming months, the official indicated.

Imports of fuel oil rose a healthy 15.1% to 4.32 million kl supported by sharp rises in imports of gasoline, kerosene and diesel oil. In terms of volume, the United Arab Emirates, Saudi Arabia and Indonesia were three largest suppliers of crude oil to Japan in October.

Domestic production of fuel oil rose a modest 3.0% to a total of 13.64 million kl, with production of kerosene and diesel oil rising while naphtha output declined, the data showed. Domestic sales of fuel oil totalled 16.83 million kl, up 7.5% from the year-earlier level, reflecting heavy domestic demand.

NEW CIRCUIT BOARD CLEANERS BARED AS CFC SUBSTITUTES

Arakawa Chemical Industries Ltd. has developed "Pine Alpha ST-900 Series" cleaning agents for printed circuit boards by capitalising on know-how obtained through more than 100 years of its rosin operations. When the treatment temperature concerned rises, the new products have two to three times more cleaning capability than the CFC-113 now in use.

They are classified into two types of hydrocarbon-based products for room-temperature cleaning and four types of higher alcohol-based ones for heated cleaning. Terpene-based cleaning agents have already been pioneered as substitutes for CFC cleaners. Unlike the forerunner substitutes, the company claims, the new products are capable of completely cleaning the surface of phenol/-epoxy boards without damaging them. Their residual ionic concentration on the surface of printed circuit boards stands at 4-6mg per square inch in terms of sodium chloride. They meet the cleaning standards for printed circuit boards of the U.S. Army, in which the corresponding figure is set at 14.4mg.

The new products neither contain halogens (fluorine, chlorine, etc.) nor affect the ozone layer. Most of them are produced from existing chemical substances covered by the Law Concerning the Examination and Regulation of Manufacture, etc., of chemical substances.

A dipping, flushing or mechanical brushing method can be applied when cleaning printed circuit boards using the new products. When put into practical use, their concentration is controlled between 50 and 100%. The new products are usable for conventional equipment employing CFC cleaner as long as it is partly modified.

Major Japanese electronics makers have tested the products and obtained good results. Planning to market the new cleaning agents on a full scale, Arakawa Chemical has named Mitsui & Co. as its general agent for them. They envisage attaining annual sales of 2,-3,000 tons worth ¥2.5-3.5 billion in the initial year.

Arakawa Chemical is scheduled to produce the agents at its three plants (Osaka, Mizushima and Onahama) in a bid to ensure their steady supplies to users. In addition, it is endeavouring to develop a total system covering from cleaning to drying processes: the target system will be suitable for the new products.

The new products are on display in an exhibition for printed circuit boards now being held in Tokyo.

Arakawa Chemical — a leading maker in Japan of rosin products — is supplying rosin to producers of solder used for the manufacture of printed circuit boards. Rosin is used by them in the form of solder flux. The company has striven to produce special solvent capable of selectively dissolving rosin and successfully developed the said cleaning agents.

SHODEN TAKES OVER JAPANESE RARE EARTH COMPOUND MAKER

Showa Denko K.K. (Shoden) has taken over a Japanese rare-earth compound supplier, Tohoku Kinzoku Kagaku K.K., by obtaining all its shares. Tohoku Kinzoku based in Iwaki, Fukushima Prefecture is a small but long-established company supplying cerium oxide and lanthanum oxide, etc., with its annual sales reaching ¥600 million. The takeover reflects Shoden's policy of expanding and strengthening business involving rare earth-related products, electronic-parts materials and ceramics. The company has so far been importing rare-earth compounds from Rhone-Poulenc SA (France) but now considers it necessary to expand its line-up and obtain production facilities and manufacturing technology in order to meet diversifying domestic needs.

AGROCHEMICAL MARKET SETBACK LIKELY TO CONTINUE IN 1990

The Japanese agrochemical market will continue to be in dull state this year, except in the case of some specific items, according to a report released by Society of Agricultural Chemical Industry (Japan).

The report forecasts that agrochemical demand in the current pesticide year (October 1989-September 1990) will dip by 1.1% from the preceding year in terms of volume. Agrochemical demand in Japan has continued to suffer year-one-year drops over the last several years.

As shown in the table, three of the four categories are projected to show slight drops; only pesticides for paddy fields are estimated to see a small gain (0.6%). The very slight growth, however, far from offsets last year's sharp drop of 17%.

The decreasing overall demand reflects the increasing use of advanced-type chemicals, leading to a decrease in the number of applications. The report projects that the acreages of every crop this year will be almost unchanged and that the occurrence of farm pests and diseases will remain at a level similar to the preceding year's.

As for herbicides, 1-shot-application ones for paddy fields are forecast to score around 10% growth with the application area concerned likely to total 1.7 million hectares. The large growth is, however, insufficient to make up for the expected drop in use of herbicides applied at the beginning of, and in the middle of, rice growth.

In addition, as price bargaining between agrochemical manufacturers and the federation of farmers' unions for the current year has been settled at a level 0.35% lower than the preceding year's in terms of weighted average, the situation will remain an unhappy one for makers.

Agrochemical demand estimates for 1990 fertiliser year (in 1,000 tons; % against preceding year's results)

	Paddy fields	Fruits	Farming	Total
Insecticides	83	17	56	156
	(100.6)	(95.5)	(99.6)	(99.7)
Fungicides	48	17	25	89
	(99.0)	(99.7)	(96.7)	(98.5)
Insecticide-fungicides	53		3	56
	(95.9)		(96.5)	(95.9)
Herbicides	108	4	31	143
	(99.7)	(96.4)	(97.9)	(99.2)
Total	292	38	115	445
	(99.3)	(95.0)	(99.1)	(98.9)

MAJOR JAPAN PAINT MAKERS LINING UP TO INDUCT *US* TECHNOLOGY

Ideal for low-heat tolerance plastic components

Some of Japan's major paint suppliers, such as Kansai Paint and Dai Nippon Toryo, are promoting a 2-component polyurethane-resin paint with vapor-catalyst hardening: a vaporised amine catalyst is mixed with the paint when it is sprayed on, which promotes hardening of the paint layer. Compared to ordinary 2-component polyurethane, this enjoys the advantages of hardening at lower temperatures and shorter hardening time, making it useful as a low-cost exterior coating for heavy steel plates with poor heat conductivity, plastics that cannot withstand high heat, leather, and the like. All manufacturers in the paint business are looking upon this crop of next-generation 2-component polyurethane resin paints with great expectations, putting their energies into finding such applications as coatings for plastic auto components.

This process, known as vapour injection curing (VIC), was developed by Ashland Chemicals of the U.S.A. In this process, the temperature and air pressure inside a vaporiser are raised, vaporising the amine catalyst within, the catalyst then being delivered to a spray gun, still in a vaporous state. When sprayed out, the atomised main component (polyol) is mixed with a hardener (isocyanate) and the vaporised amine, the paint hardening process being designed to proceed while they are in contact. The catalyst is dimethyl ethanolamine, a tertiary amine.

By using a tertiary amine as the catalyst to promote hardening in the VIC process, the heat and time needed for the hardening are reduced, compared to ordinary 2-component polyurethane-resin paints. Whereas normally the hardening process takes 30 minutes at 80°C, 10-15 minutes at 60°C is enough for the VIC process. Further, one can set up a practical VIC painting system by simply equipping a paint room with a vaporiser and a heat regulator.

As such, energy consumed in the painting process is reduced, painting productivity is improved, and costs in general are cut. Aside from this, it makes for easier painting of materials that do not stand up to heat, such as plastic, leather, fibers, and wood. It speeds paint hardening on heavy steel plates, castings, and other objects with high thermal capacity. It is effective for

paint layers upto 100 um thick, acts to prevent debris from becoming attached while the work-piece is drying, and suppresses the appearance of pinholes in pieces full of crannies.

Looking at it in these terms, it is natural that Japan's major paint companies have been starting to promote paints using the VIC process, and in addition to Kansai Paints and Dai-Nippon Toryo, Shinto Paint and Kawakami Paint have also introduced Ashland Chemical's Technology, and will be bringing acryl-urethane and polyester-urethane family paints to market. Although still in the testing stage, use in fields like automotive-seat molding compound, in urethane bumper undercoating, as an outer layer for agricultural equipment, and as a coating for other automotive and agricultural-machinery cast parts, is being aggressively investigated. Along with plans to improve paint technology in terms of hardening speed and materials with better adherence, paint manufacturers are looking to extend this advancement throughout the industry.

JAPAN FIRM, ROCHE AGREE ON MUTUAL INTERLEUKIN LICENSING

Dainippon Pharmaceutical Co. and F. Hoffmann-La Roche (Switzerland) have reached agreement to license to each other their respective patents associated with human interleukin-1α (IL-1α) prepared by means of genetic engineering. T e patents licensed cover all the countries in the world.

Dainippon's IL-1α is now undergoing clinical testing at National Cancer Institute of the U.S. and Roche will reportedly soon begin clinical testing of its IL-1α. Along with the mutual licensing, they will separately tackle R & D for commercialisation of the agents as remedies for cancer and other diseases.

IL-1α is a protein produced by macrophage, which is broken down into two types — α-type having 159 amino acids and β-type with 116 amino acids. It is known that they have such actions as activation of T cells, stimulation of B-cell production, action against infection and suppression of cancer, etc.

Dainippon became the first company in the world to succeed in mass-production of IL-1α in 1985 via gene modification using E. coli, and it was then followed by Roche and an American firm. The three IL-1α s of these firms differ slightly from each other, and the Japanese firm says the latest step is intended to secure patient implementation rights within this year for the substances developed by itself and Roche. Osaka-based Dainippon had filed patent applications with drug authorities in 13 countries, including Japan, the U.S. and some European ones, together with Basell-based Hoffmann-La Roche.

CANADA'S NO. 1 PIGMENT MAKER TAKEN OVER BY JAPANESE FIRM

Kikuchi Color & Chemicals Corp. has announced that it purchased all the shares of Dominion Colour Company — Canada's No. 1 pigment maker —as of December 20 and had made it its wholly owned subsidiary. The name of the Canadian firm has been changed to Dominion Colour Corporation with Peter Birrell taking the post of president. The takeover value has not been disclosed.

With the takeover, the Japanese firm has acquired a production base in Canada, following the one in the U.S. and become, it says, the world's top pigment maker. Dominion Colour, Canada's largest pigment maker, is based in Toronto with two plants of 10,500-t/y capacity for inorganic pigments, mainly chrome yellow and vermillion, and 2,800-t/y capacity for organic pigments.

The Canadian maker holds large shares of the market in the U.S., Euro and Southeast Asia as well as Canad The take-over thus offers Kikuchi stro footholds in these overseas markets

The Japanese firm is producing pi ments in Ukima, Tokyo and its Ame ican subsidiary is operating a 24,000-t inorganic pigment plant in New Jerse In Japan, it is planning capacity expa sion for organic pigments who demand is expected to grow in futu

POLYSTYRENE-FOAM MAKE JOINTLY SET UP IN U.S.

Bokusui Corp. and Kasahara Indu try Co. have established a 50/50 jo company called K & B Foam in L Angeles, the United States. The n company is scheduled to produce a market polystyrene foam by buildin manufacturing plant in the Maquilad industrial zone located in Tijua Mexico.

It has obtained a 23,000-m² site the zone and plans to start building new plant this March with complet scheduled for September. The plant w be run by EFISA, which has been up by K & B Foam.

The plant to be staffed with employees will have 16 units of mo ing equipment developed by Kasah Industry. K.B. Foam envisions prod ing 1,200 tons a year of polystyr foam in the initial stage and attain annual sales of $6.4 million.

Polystyrene foam produced by new plant will be supplied to major J anese makers of household electr appliances located in the Mexican c The product will be employed cushioning material.

Bokusui is emphasising overs operations in a bid to increase its ann sales to Y100 billion in fiscal 1992. company has already established m keting bases in the States, Taiwan Singapore.

New Developments from Japan

OUR-HELIXES OF HUMAN ROWTH HORMONE RECOMINED

Protein Engineering Research Institute has succeeded in producing ∝-helix-combined human growth hormone, aving the way for molecular designing ıd modification of proteins.

Human growth hormone consists of ur ∝-helixes: the No. 1 and No. 2 elixes exist in parallel with each other ıd the No. 3 and No. 4 ones also exist parallel with each other but their omponents are arranged in reverse rder compared with No. 1 and No. 2 elixes. The two pairs of ∝-helixes are ombined with each other by means of vo large loops.

The institute has produced new type uman growth hormone by rearranging ıe order of the four ∝-helixes — they vere rearranged in the order of Nos. 2, , 1 and 4 —, thereby disbanding the oop structure.

In more concrete terms, it made uman growth hormone — which was roduced by Escherichia coli on the asis of genetic recombination technolgy — water soluble by using seven nols of urea and refined the resultant roduct under the presence of octyl lucoside.

Unmodified human growth hormone onsists of 191 amino acid residues but he new-type one is composed of 131 mino acid residues: the latter's molecılar weight stands at 14,000, roughly wo-thirds of one original human rowth hormone.

In-vivo tests for new product have hown that it has no activity. Researchers at the institute guess that the abovenentioned loops may include genes apable of controlling expression of the ıctivity concerned or the new product nay have been deprived of the activity when it was turned water soluble. They plan to separate the four helixes from each other and elucidate the functioning mechanism of human growth hormone.

SILICONE RESIN TO PROTECT LSI-CHIP SURFACES DEVELOPED: M'BISHI ELECTRIC

Mitsubishi Electric's Production Technology Laboratory has developed a silicone resin for use in protecting the surfaces of megabit memory chips. Along with increasing circuit density, packaging resins put stress on chips, with an adverse effect on the chip's characteristics.

The silicone resin developed by Mitsubishi Electric, however, features low stress, high heat resistance, and high compatibility with silicon wafers. It protects the surface of LSI chips and acts as a buffer layer to reduce the stress caused by packaging resins. Mitsubishi will be building a plant to manufacture the resin at a subsidiary, Ryoden Kasei (Headquarters: Mita, Hyogo Prefecture) around the middle of next year, and will be bringing it to market.

Buffer coatings for ULSIs serve to prevent the malfunctions that follow from a breakdown in the passivation layer on the surface of a chip, which is caused by stress from the packaging resin or the silica within in. DRAM chips of 256K bits or higher require such a buffer.

While current buffer coatings use polyimide resin, it is notorious for shrinking by more than 30% in the thermosetting process, causing great stress, and it has poor adhesion. Mitsubishi Electric focused on making a silicone resin that has high affinity with silicon wafers, as well as raising heat resistance and reducing stress.

While common silicone resins have a linear molecular structure built on siloxane (SiO) bonds, Mitsubishi Electric, by using catalysts and reaction-control technology, created one with a ladder-shaped macromolecular structure (molecular weight: app. 100,000), which reduces sitting shrinkage and raises heat resistance to 500°C.

Other uses for the material include use in EPROMS, taking advantage of its UV permeability; and taking advantage of its low permitivity, it can be used as interlayer insulation in multilayered aluminium wires, or as a surface protection for solar collectors.

Production of polyimide, the raw material for current buffer coatings, is at about 10 tons/year. Ryoden Kasei will be handling production for Mitsubishi Electric, and will be marketing this new coating at competitive prices from the middle of next year.

MOLECULAR COMPLEX WITH HIGH ELASTICITY BARED: STUDY GROUP

In line with the MITI-set Fundamental Technology R & D Promotion System for the Coming Age, a study group tackling highly crystalline macromolecular material has developed a "molecular complex" having a high flexural modulus of 102 gigapascals, lower than that of epoxy-based composite but far higher than that of aluminium (70 gigapascals). The study group is comprised of five Japanese chemical companies.

The molecular complex was produced by combining low-crystalline aromatic copolymer polyamide (PPOT-50) having ether bondings with poly-p-phenylenebenzobisthiazole (PPBT), transforming the resultant product into tapes and thermally laminating them. PPOT-50 consists of a stiff component (P-phenylene-terephthalamide) and a flexible component (4-diaminodiphenyl ether terephthalamide).

PPOT-50 — folded macromolecules — served as matrix, which was reinforced by stiff, stick-shaped macromolecules (PPBT).

In molecular complexes, heterocyclic aromatic macromolecules (stiff, stick-shaped macromolecules) are dispersed in folded macromolecules (matrix). They have properties similar to those of carbon fiber-reinforced plastics.

Unlike carbon fiber-reinforced plastics, the new product can easily be processed into targeted products without employing complicated methods. The study group has successfully developed the new product by improving the fusing/high-orientation properties of macromolecular matrix.

METALLIC EPITAXIAL FILM MAY OFFER NEW SUPERCONDUCTIVE MATERIAL

National Research Institute for Metals attached to Science and Technology Agency has succeeded in synthesising a Pd-Te (palladium-tellurium)-based intermetallic compound membrane as well as developing it into an epitaxial film by means of molecular-beam epitaxy. This is thought to be a world first.

It is believed that this success will result in a new material for superconductive products. The achievement has come about from the institute's efforts to produce metal-semiconductor-, metal-ceramic- and intermetallic compound-based membranes having a higher superconductive property.

It is reported that a single-phase crystalline membrane of the Pd-Te compound has been formed by precisely controlling temperature and the ratio of molecular-beam strength of the two metals. In concrete terms, molecular beams of Pd_1 and Te_4 are simultaneously at 300°C and in a ratio of molecular-beam strength of 1:1.

NEW SILICONE ADHESIVE LENGTHENS LIFE OF ELECTRONICS EQUIPMENT

Toray Dow Corning Silicone Co. has developed and started marketing a silicone adhesive for electronics equipment, in which the content of low-molecular siloxane has been markedly reduced.

The molecular siloxane is left nonreactive after silicone polymerisation. It forms insulating film in the form of SiO_2 and SiC and thereby interferes with electrical contact in micromotors, relays and switches all incorporated in electronic/electrical equipment. As a result, it reduces their lives.

Other makers of silicone adhesives have hitherto commercialised those designed to avoid electrical-contact troubles by eliminating cyclic siloxanes (Si-O components: 4-10) from silicone adhesives. Cyclic siloxanes having many more Si-O components (11-20) as well have been purged from the new products.

It is claimed that the new product is capable of lengthening the life of a micromotor to about 600 hours. The corresponding figures for conventional and upgraded products stand at 10-12 and 200 hours, respectively. The new product quickly cures, has no corrosive properties, can be applied to many more types of material and has stronger heat/moisture resistance. The company plans to attain annual sales of the new product reaching ¥3,000 million in two to three years.

NEW PACKING MATERIAL SERVES TO REFINE EPA: SHISEIDO

Shiseido Co. has developed a new type spherical clay mineral used as packing material for a high-performance liquid chromatograph (HPLC). In addition, the company — together with The Sagami Chemical Research Center —has established a high-purity refining method for eicosapentaenoic acid (EPA) produced by marine microorganisms; the EPA was originally pioneered by the research center.

The new packing material is produced by spray-drying water-soluble gel of synthetic hectorite. It has fine pores (diameter: 40A) and its specific surface and diameter stand at 300 m^2/g and 10-20 micrometers, respectively. It is possible to add various types of cations to the material since it has ion-exchanging capability. When a metallic complex having optical activity is added thereto, the material may be employed as an optical resolution agent.

Used for the abovementioned high-purity refining EPA was a spherical clay mineral to which silver was added by means of ion exchanging and which is capable of distinguishing between saturated and unsaturated products. The product is superior to silver nitrate-impregnated silica gel in that it can be used for refining purposes since the silver is not separated therefrom.

The targeted EPA is contained at the ratio of 30% in fatty acids, which are produced by enteric bacteria living in sea fishes including horse mackerel and mackerels. The fatty acids consist of only saturated ones, monoenoic acid and EPA (both unsaturated fatty acids).

Paying attention to the unique structure of the fatty acids and the said distinguishing properties of the new packing agent, Shiseido and the research center put the products in an HPLC whose column was packed with the agent and obtained 97%-pure EPA ethyl ester using a single adsorption/desorption process. 20 grams of EPA ethyl ester were extracted from 60 grams of the fatty acids. Shiseido has established technology for further raising the purity to more than 99% using polymer-coated packing material which has been marketed by the company itself.

MARKET INFORMATION

Ethanolamines Up

Prices of ethanolamine (tri) was up in the Bombay Chemicals market due to price revision by a major manufacturer. Material was being traded at Rs. 85 per kg. Titanium dioxide eased further on good availability and quoted at Rs. 75 per kg for anatase variety. Trading was satisfactory and easy availability of material at steady prices was noted. Market sentiments were jittery in anticipation of changes in the advance release facilities now being offered.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on February 6, 1990)

INDUSTRIAL CHEMICALS	Per Kg.
Ammonium sulphate	2.50
Ammonium phosphate (Mono)	14.50
Ammonium phosphate (Di)	14.00
Ammonium carbonate (Di)	17.00
Ammonium bicarbonate	5.60
Ammonium chloride	4.00
Ammonium nitrate	6.00
Arsenic white powder	22.00
Acrylamide (Resale)	70.00
Barium carbonate	6.00
Bleaching powder (33% Cl)	4.20
Borax (Granular)	18.00
Borax (Powder)	22.00
Boric acid (Tech)	26.00
Bisphenol-A	70.00
Butyl carbitol	110.00
Caustic soda (Flakes)	11.00
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	4.25
Calcium carbonate (Activated)	4.75
Cobalt oxide	300.00
Cresylic acid	62.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	43.00
Copper sulphate	25.00
Chromic acid	63.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	110.00
Hydro	40+ST

Hyflosupercell	21.00
Hexamine (Resale)	35.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	31.25
Lithopone	19.00
Magnesium chloride (Crystal)	3.00
Menthol crystal (Flakes)	355+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	18.00
Maleic Anhydride (Resale)	40.00
Mercury (34.5 Kgs)	11,500.00
Nickel chloride	110.00
Oxalic acid (Resale)	17.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	25.00
Potassium carbonate (Imported)	36.00
Potassium bichromate	36.00
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	115.00
Polyvinyl alcohol (No. 173)	115.00
Polyvinyl alcohol (No. 208)	150.00
Paraformaldehyde (Resale)	22.00
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	49.00
Paraffin wax	19+ST
Rangolite (German)	90+ST
Rangolite (Czech.)	70.00
Sodium sulphate (Fine)	3.70
Sodium sulphate (Coarse)	3.60
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	20.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	730.00
Sodium chlorite 80% (Spain)	95.00
Soda Ash (Tata)	4.80
Soda Ash (Birla)	4.30
Soda Ash (Imp.)	4.50
Sodium bicarbonate	7.50
Sodium bisulphite	7.50
Sodium silicate	3.00
Sodium acetate	8.00
Sodium alginate	320.00
Titanium Dioxide (Anatase)	75.00
Titanium Dioxide (Rutile – RCR_2)	105+ST
Tartaric acid	120.00
Trisodium phosphate	5.50
Thiourea	83.00
Urea (Tech.)	2.90
Vacuum salt	1.00
Zinc Dust	32.00
Zinc Oxide	53.00
Zinc chloride powder (Tech.)	12.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.00
Acetic Anhydride (Resale)	37.00
Acetone (Resale)	18.00
Adipic Acid	70.00
Aceto Acetanilide	55.00
Aniline Oil	48.00
Benzoate Plasticiser	62.00
Butyl acrylate	84+ST
Butyl stearate	45.00
Butanol	32+ST
Benzyl Alcohol	60.00
Benzyl Chloride	34.00
Benzo trichloride	16.00
Benzoyl chloride	22.00
Bromine Liquid	65.00
Chloroform	31.00
Carbon Tetrachloride	21.00
Cellosolve	60.00
Cyclohexanone	54.00
Cyclohexanol	58+ST
Diacetone (Resale)	34.00
Diethyl Oxalate	34.00
Diethyl glycol (DEG)	30.00
Dioctyl Phthalate	45.00
Diallyl Phthalate	46.00
Dimethyl Phthalate	28.00
Dioctyl Adipate	52.00
Dibutyl Adipate	42.00
Dipentene	15.00
Dimethylamine 40%	52.00
Dimethylamine 50%	58.00
Ethyl Acetate	20.00
Ethyl Acrylate	72.00
Ethylene Dichloride	13.50
Ethylene Glycol	38.00
Formic Acid (Imp.)	24.00
Formaldehyde (Resale)	7.50
Glycerine (CP)	55.00
Glycerine (IW)	54.00
Hydrogen Peroxide 50% (Resale)	26.50
Isopropyl Alcohol	29.00
Isobutyl Alcohol (Resale)	30.00
Monoethanolamine (Resale)	90.00
Melamine	57.00
Methyl Ethyl Ketone	28.00
Methyl Isobutyl Ketone	38.00
Methyl Acrylate	66.00
Methylene Dichloride (Resale)	16.00

Carbitol	60+ST
Meta Cresol	45.00
Nitrobenzene	25.00
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	36.00
Propylene Glycol	58.00
Polyethylene Glycol (No.200)	58.00
Polyethylene Glycol (No.400)	62.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	70.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	40+ST
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	29.00
Triethanolamine (Resale)	85.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	42.00

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	13.00
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	13.50
Xylene	18.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	170.00
Aceto Acetic Ester (Methyl)	68.00
Ammonium Molybdate	210.00
Anthraquinone	135.00
Anthranilic Acid	78.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	257.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	95.00
Bromamine Acid	550.00
BON Acid	130+Ex+Ta
Chicago Acid (Atul)	355.00
Coach Acid	52.00
C. Acid (Imp.)	210.00
Cyanuric Chloride	140.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	70.00
Diethyl Aniline	160.00
Diamino stilbene disulphonic acid	168.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	205.00
H. Acid (Atul)	115.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	350.00
J. Acid Urea	410.00
K. Acid	125.00
MPDS (German)	185.00
MNA	140.00
Meta Ureido Aniline	230.00
MPD (Local)	205.00
MPD (Japan)	240.00
Naphthenic Acid	25.00
N-Methyl J. Acid	580.00
N-Methyl Aniline	125.00
Naphthalene (Refined)	23.00
Ortho Anisidine (OA) (Imp.)	108.00
Ortho Dichloro Benzene (ODCB)	20.00
OT Base	130.00
Para Dichloro Benzene (PDCB)	32.00
Para Anisidine (PA local)	160.00
PNA	120.00
Para Cresidine (Imp.)	410.00
Para Amino Azo Benzene (India)	150.00
PNCB	62.00
Para Amino Acetanilide	190.00
1-Phenyl 3-Methyl 5-Pyrazolone	140.00
Phenyl J. Acid	340.00
Para Amino Benzoic Acid	165.00
PT Base	140.00
Rhoduline Acid	550.00
Resist Salt 80%	28.00
Resorcinol	210.00
Sodium Naphthionate	67.00
5-Sulpho-Anthranilic Acid	75.00
Sulphanilic Acid	33.00
Sulpho Tobias Acid	160.00
Trichloro Benzene (TCB)	24.00
Tobias Acid	166.00
Metanilic Acid	43.00
MTD	120.00

Bombay Dyes Market

(Prices as on February 6, 1990)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	422.40
Red FB	425.80
Red Violet FBL	622.00
Orange 3R	254.20
Violet 3R	370.50
Violet RL	355.70
Violet 6R	638.20
Scarlet RR	283.50
Rubine 3B	289.10
Rubine CB	449.50
Blue GL	419.00
Blue BGF	805.80
Navy Blue RE	359.90
Brown 3REL	272.80
Black GEL	420.10
Dark Brown 3B	411.10

BASE COLOURS	Per Kg.
Fast Yellow GC	77.75
Fast Orange GC	128.40
Fast Scarlet R	198.05
Fast Scarlet RC	128.40
Fast Scarlet RCR	105.60
Fast Scarlet G	115.75
Fast Scarlet GN	92.95
Fast Scarlet GG	77.75
Fast Scarlet GGS	73.95
Fast Red B	233.50
Fast Red RC	115.75
Fast Red R Flakes	158.80
Fast Red TR	181.60
Fast Red TR Oil	223.35
Fast Red RL	251.20
Fast Red KB Oil	251.20
Fast Bordeaux GP	236.00
Fast Garnet GBC	103.05
Fast Violet B	548.80
Fast Blue BB	566.50

NAPHTHOL COLOURS	Per Kg
ASG	301.[illegible]
AS	205.[illegible]
ASSW	379.[illegible]
ASBS	253.[illegible]
ASBO	266.[illegible]
ASD	209.[illegible]
ASOL	243.[illegible]

ASTR	369.00
ASPH	336.05
ASE	236.00
ASEL	249.95
ASLB	2002.35
ASBT	2459.45
ASWG	143.00
ASSG	538.65
ASSR	652.60

PROCION COLOURS	Per Kg.
Golden Yellow HR	207.95
Brill. Yellow H4G	145.65
Supra Yellow H-8GP	168.55
Brill. Yellow HE6G	214.75
Yellow G-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	275.45
Yellow MGR	387.65
Brill. Yellow M4G	201.15
Brill. Yellow M8G	366.10
Yellow M3R	244.70
Brill. Orange H2R	303.80
Brill. Red H7B	157.95
Brill. Orange M2R	313.15
Brill. Red H8B	213.55
Brill. Scarlet H RN	245.05
Supra Red H-3BP	179.80
Brill. Red H-F3B	243.45
Brill. Magenta HB	182.00
Brill. Red M 5B	160.05
Brill. Red M 8B	218.35
Brill. Pink MB	137.10
Brill. Magenta MB	163.65
Brill. Purple H-3R	219.55
Brill. Purple H-7R	175.40
Navy Blue H 3R	333.75
Brill. Blue H-GR	406.40
Brill. Blue H5G	207.95
Blue H 5RX	286.20
Brill. Blue H 7G	213.95
Brill. Blue H 7RX	358.15
Turquoise HA	265.05
Supra Blue H-3RP	595.30
Supra Turquoise H 2G P	181.50
Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr.	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: FEB. 2, (NNS) Tartaric acid France went up sharply by Rs. 600 at Rs. 15,000 per 50 kg in the local chemicals market during last week, in the absence of fresh import from France, as well as, negligible stock position in the market, says NNS. Trishul Marka desi tartaric acid also, recorded a sharp rise of Rs. 200 at Rs. 4,450 per 15 kg on account of brisk and bulk purchases by cheese makers. In view of brisk seasonal consumption, citric acid Bombay Dyeing hardened further by Rs. 50 at Rs. 2,450 per 50 kg while citric acid China slipped by Rs. 20 at Rs. 2,080 per 50 kg due to lack of fresh offtake.

Soda bicarb Tata and Nal advanced by Rs. 13/15 at Rs. 300 and Rs. 305 per katta due to increased demand and dwindling supply. Caustic soda flake hardened further by Rs. 15 at Rs. 525 in view of poor supply from Gwalior Rayon. As a result of spurt in demand by stockists and consumers alongwith higher advices from Bombay, chatkolite and sufolite jumped up by Rs. 5 each at Rs. 57 and Rs. 72. In the absence of fresh import, rangolite Germany remained static at Rs. 90. Acid slurry soft moved up by Rs. 2 at Rs. 30 in view of good demand by detergent powder manufacturers. Acid slurry hard, on the other hand, remained unchanged at its previous week's level.

In the wake of fresh offerings by the stockists of U.P. menthol flake medium and bold declined by Rs. 20/25 at Rs. 305, Rs. 335 and Rs. 345 per kg respectively in the beginning of the week but later in the wake of fresh demand by the speculators of Delhi and fall in supply from U.P. prices of these commodities finally placed at Rs. 335, Rs. 365 and Rs. 380 per kg.

Mentha oil and DMO were quoted at Rs. 240/260 and Rs. 125 per kg respectively. Due to acute shortage of goods, borax granular and crystal rose by Rs. 10 at Rs. 835 each per kattas. Hydrogen peroxide remained static at Rs. 26/26.50 followed by higher advices from Bombay, while hexamine drifted lower by Re. 1 at Rs. 34 due to poor enquiries.

No change was recorded in dyes and colours during the week.

(DELHI MARKET RATES AS ON FEBRUARY 2, 1990)

Ammonia Bicarb (Per 25 Kg.)	140.00
Mercury (Per flask)	11,800.00
Soda ash (Per bag)	340/355.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	525.00
Citric acid (Per 50 Kg.)	2,080/2,450.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCI (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	300/305.00
Sodium Hydrosulphite (Per Kg.)	34.00/36.50
Rangolite (Per Kg.)	90.00
Tartaric acid (Imp) (50 Kg.)	15,000.00
Sufolite (per Kg.)	72.00
Chatkolite (per Kg.)	57.00
DMO	125.00
Boric acid Technical (Per 50 Kg.)	1,350.00
Paraffin Wax (Per 50 Kg.)	865.00
Tartaric Acid (Indian Per 15 Kg.)	4,450.00
Borax Granular (Per 50 Kg.)	835.00
Borax Crystal (Per 50 Kg.)	835.00
Sodium Nitrite (Per 50 Kg.)	1,000/1,100.00
Sodium Nitrate (Per 50 Kg.)	450.00
Camphor Thal (Per Kg.)	104.00
Camphor Powder (Per Kg.)	95.00
Menthol Bold (Per Kg.)	380.00
Menthol Medium (Per Kg.)	365.00
Menthol Flake (Per Kg.)	335.00
Menthol Oil (Per Kg.)	220/240.00
Glycerine (Per Kg.)	55/58.00
Sodium Silicate (Per quintal)	275/350.00
Hexamine (Per Kg.)	34.00
Acetic Acid Glacial (Per Kg.)	15.00
Copper Sulphate (Per quintal)	2,400/2,750
Formic Acid (Per Kg.)	23.50
Formaldehyde (Per Kg.)	8.50
Hydrogen Peroxide (Per Kg.)	26/26.50
Calcium Carbonate (Per Tonne)	2,500/4,000
Acid Slurry Soft (Per Kg.)	30.00
Acid Slurry Hard (Per Kg.)	38.00
Phosphoric Acid (Per 50 Kg.)	1,050.00
Potassium Nitrate (Per quintal)	900/1,200.00
Potassium Permanganate (Per 50 Kg.)	2,800/3,200.00
Sodium Bichromate (Per 50 Kg.)	1,575/1,600.00
Trisodium Phosphate (50 Kg.)	625.00
Titanium Dioxide Anatase (Per Kg.)	82.00
Titanium Dioxide RC-822 (Per Kg.)	95.00
Titanium Dioxide K-Brand (Per Kg.)	75.00
Titanium Dioxide RCR-2 (Per Kg.)	105.00
Zinc Oxide (Per metric tonne)	42,000/48,000.00
Phenol Carbolic Acid (Per Kg.)	37.00
Carbon Tetrachloride (Per Kg.)	24.75
Chloroform (Per Kg.)	28.00
Sodium Sulphate (Per metric tonne)	3,400/3,700.00
Naphthalene Balls (Per 50 Kg.)	1,450.00

DYES & COLOURS	(Per Kg.)
Naphthol AS	175/201.65
Naphthol ASG	180/295.20
Naphthol ASBS	210/248.45
Naphthol ASTR	275/360.45
Naphthol ASOL	210/238.60
Naphthol ASBO	195/260.75

DIRECT DYES	(Per Kg.)
Black E. Conc.	120/176.90
Diazo Black B.T.	105/147.55
Green B	90/140.55
Blue 2-B	60/101.40
Blue 2-B 225% (JNR)	125.00
Sky Blue FB	160/235.05
Basic Auramine	55/110.00
Basic Rhodamine	300/425.00
Basic Methylene Blue	100/180.00
Basic Violet	165/210.00
Basic Malachite Green	175.00
Acid Orange	75/111.20
Congo Red H/C	75/120.95

Madras Market

Dull to moderate conditions prevailed in the Madras chemicals market. Certain amount of uncertainity is caused by falling prices and impending budget which may come soon after the state elections. Trade is keenly looking forward to major changes in the import policy of the Government especially that of imports under OGL. Caustic soda and soda ash the vital parameters of the chemical market have maintained old levels. Expectations of price increase due to power restrictions in the coming summer months are there. Trisodium phosphate prices have jumped up to Rs. 13 per kg on account of acute short supply.

(MADRAS MARKET RATES AS ON FEBRUARY 3, 1990)

Acetic Acid Glacial (per kg)	14.50
Aluminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	150.00
Ammonium Chloride (per MT)	3,000.00
Acid Slurry (per kg)	31.00
Barium Carbonate (per kg)	9.00
Barium Chloride (per kg)	8.00
Boric Acid Technical (per kg)	24.00
Bleaching Powder (per 50 kgs)	220.00
Borax (per 50 kgs)	700.00
Caustic Soda Flakes – Mettur Chemicals (per MT)	10,500.00
Caustic Soda Flakes – Andhra Sugars (per MT)	10,500.00
Calcium Chloride 70% Solid (per MT)	3,000.00
Calcium Chloride Anhydrous (per MT)	5,500.00
Calcium Carbonate (Activated) (per MT)	6,000.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	130.00
Pure Para Cresol 96% (per kg)	85.00
Meta Para Cresol 42% (per kg)	50.00
Formic Acid (per kg)	26.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	49.50
Hydrosulphite of Soda (TCPL) (per kg)	38.00
Hydrosulphite of Soda (IDI) (per kg)	41.00
Hydrosulphite of Soda (BASF) (per kg)	42.00
Hexamine (per kg)	30.00
Hyflosupercell (per kg)	19.50
Hydrogen Peroxide (per kg)	31.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	40.00
Magnesium Carbonate (per kg)	18.00
Magnesium Chloride (per kg)	3.50
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	350.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	17.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	25.00
Polyvinyl Alcohol Powder (per kg)	130.00
Pentaerythritol (per kg)	50.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	360.00
Soda Ash (TATA) (per 75 kgs)	360.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	14.00
Sodium Bisulphite (per kg)	4.60
Sodium Alginate (per kg)	235.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	3.50
Titanium Dioxide (Anatase) (per kg)	78.00
Titanium Dioxide (Rutile) (per kg)	95.00
Trisodium Phosphate (per kg)	13.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	50.00
Zinc Chloride Powder (per kg)	13.00
Zinc Sulphate (per kg)	8.00

SOLVENTS

Acetone -- HOCL (per kg)	20.00
Butanol (per kg)	34.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	14.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	20.00
Chloroform (per kg)	28.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	34.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	42.00
Di-N-butyl Phthalate (per kg)	42.00
Ethyl Acetate (per kg)	22.00
Isopropyl Alcohol (per kg)	29.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	22.00
Methyl Ethyl Ketone (per kg)	34.00
Methyl Isobutyl Ketone (per kg)	42.00
Phenol (per kg)	38.00
Sorbitol (per kg)	16.00
Triethanolamine (per kg)	95.00
Trichloroethylene (per kg)	26.00
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	16.00
Xylene (per lit)	24.00

International Bulk Chemical Prices

Spot Prices are as on January 17

Product	European Spot price range ($/ton)	US Spot price range ($/ton)
Ethylene	370- 390 (cif)	463 (Spot)
Propylene (100% basis)	342- 360 (cif)	309- 330 (spot)
Butadiene	580- 600 (fob)	683- 760 (spot)
Benzene	400- 420 (fob)	435- 438 (spot)
Toluene	315- 320 (fob)	355 (spot)
Xylenes (Virgin)	295- 300 (fob)	330- 333 (spot)
(Solvent)	290- 295 (fob)	n.a.
Styrene	1190-1250 (T2) (fob)	1234-1256 (spot)
	1175-1235 (T1) (cif)	
Paraxylene	415- 430 (fob)	562
Orthoxylene	315- 325 (fob)	n.a.
Ammonia	125- 130 (cif)	n.a.
Methanol	123- 128 (T2) (fob)	n.a.
	100-105 (T1) (cif)	
Naphtha	188- 189 (cif)	n.a.

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx. sailing dt (5)
Stream	Windmill Pride	West Coast	Romania. (Carting at 2-ID).	15/2
9/2	Birgit Naber (Ger)	Samrat/ Hindustan/ Merzario	Felixstowe; Hamburg; Rotterdam; Also London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembly; Birmingham; Liecester; Le Havre; Amsterdam; Bremen; Antwerp; Copenhagen; Leeds; Aarhus; Gothenburg; Oslo; Stockholm; Helsinki; Belfast and all destination in U.K. Belelux Germany; Italy; France; Switzerland & Austria. (Carting at M.O.D. No. 2 for Merzario) (Carting at M.O.D. No. 1 for Samrat & Hindustan).	17/2
12/2	Uni Pioneer (V-023)	Greenways	Hamburg; Felixstowe; Rotterdam; Antwerp; Le Havre; London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembly; Birmingham; Leeds; Leicester; Amsterdam; Bremen; Copenhagen; Aarhus; Gothenburg; Oslo; Stockholm; Helsinki; Belfast and all destinations in U.K.; Germany; Switzerland & Austria. (Carting at G/H Cotton Depot).	17/2
12/2	Seacrest Achiever (V-207) (Ger)	Merzario	Jeddah; Hodeidah; P. Sudan; Ravenna; Ancona; Piraeus; Venice; Trieste. (Carting at M.O.D. No. 2).	17/2
		Seaspeed/	Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Scandinavian ports. (Carting at Hay Bunder No. 5).	
		L. Triest/	Jeddah; Trieste; Venice; Ravenna; Rijeka; Naples. (Carting at M-171/173 C.D.).	
		Oceanic/	P. Said; Limassol; Alexandria; Casablanca; Tripoli; Livorno; Genoa; Mersin; Iskendren; Izmir. (Carting at Wadi Bunder No. 3).	
		Killick/	Jeddah; Felixstowe; London; Liverpool; Manchester; Bristol; Avonmouth; Leeds; Glasgow; Tilbury; Birmingham; Dublin; Belfast; Rotterdam; Hamburg; Le Havre; Antwerp; Bremen; Bremerhaven; Fos; Valencia; Marseilles; Barcelona and Scandinavian ports. (Carting at M-178/180 Cotton Depot).	
		U.L.A.	P. Sudan; Aden; Djibouti; Hodeidah. (Carting at 14-VD).	

(1)	(2)	(3)	(4)	(5)
20/2	Menkar	P&O	Assab; Djibouti; P. Sudan. (Carting at Timber Pond No. 4).	22/2
14/2	Maersk Clementine	Volkart Fleming	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K. and Scandinavian ports. (Carting at M.O.D. No. 3).	18/2
18/2	Medipas Bay	L. Triest/	Jeddah; Barcelona; Marseilles; Genoa; Leghorn; La Spezia; Naples with TP Trieste; Venice; Ravenna; Bari; Koper; Rijeka; Las Palmas; Santacruz; De Tenerriffe; Malta; Limmassol; Alexandria; Casablanca; Tunis; Algiers; Lattakia; Tripoli; Benghazi; Oran; Point E Pitre; Port De France. (Carting at M-171/173 Cotton Depot).	22/2
		Samrat/ Hindustan/	Barcelona; Marseilles; La Spezia; Livorno; (Leghorn): Genova; Naples and other Italian ports and FCL only Beirut; Alexandria; Valletta; Lattakia; Mersin. (Carting at M.O.D. No. 1 for both).	
		Merzario	Genoa; Leghorn; La Spezia; Naples; Salerno; Marseilles; Barcelona. (Carting at M.O.D. No. 2).	
14/2	CMB Energy (N. Sheva)	C.M.B.	Djibouti; Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Carting at Kalamboli).	16/2
14/2	Nedlloyd Himalaya (N. Sheva)	Patvolk/ S.W.&Co./ Trident/ P&O	Tilbury; London; Felixstowe; Avonmouth; Manchester; Liverpool; Glasgow; Leeds; Birmingham; Dublin; Belfast; Bristol; Marseilles; Genoa; Barcelona; Le Havre; Antwerp; Rotterdam; Hamburg; Bremerhaven; Copenhagen; Oslo; Helsinki; Malmao; Gothenburg; Stockholm; Aarhus; Alborg. (Carting at Kalamboli for all).	16/2
26/2	Tibor Szamuely (Rus) (V-106 W/B	Transocean	Odessa; Izmail; Reni (U.S.S.R); Russe; Bulgaria; Budapest (Hungary); Linz; Vienna (Austria); Bratislava (Czechoslovakia); Deggendorff; Regensborg (West Germany); (all ports on River Danube) (Carting at N/O-PD & G-PD).	27/2
11/2	Tulsidas	S.C.I.	Colombo; Chittagong. (Carting at Timber Pond No. 1).	14/2
12/2	Uni Pioneer	Greenways	Colombo. (Carting at G/H Cotton Depot).	17/2
18/2	Medipas Bay	L. Triest	Colombo (Carting at M-171/173 Cotton Depot).	22/2
9/2	Kota Mutiara	Mackintosh	Karachi (Afghanistan)	16/2
11/2	Tulsidas	S.C.I.	Singapore and Far East Ports. (Carting at Timber Pond No. 1).	14/2
11/2	Mikhail Olminskiy	Transocean	Singapore; Main Japan Ports.	20/2
12/2	Uni Pioneer (V-023)(Pa	Greenways	Singapore; Penang; Port Kelang; Bangkok; Djakarta; Surabaya; Manila; Cebu; Kaohsiung; Keelung; Osaka; Yokohama; Kobe; Shimizu; Moji; Nagoya; Pusan; Hongkong. (Carting at G/H Cotton Depot).	17/2
6/2	Kamnik (Yug)	Depe	Hongkong; Keelung; (Kaohsiung); Kobe; Yokohama; Busan; (Carting at CFS Cotton avenue for Containers only).	13/2
11/2	Tulsidas (Ind)	S.C.I.	Melbourne; Fremantle; Adelaide; Sydney. (Carting at Timber Pond No. 1).	14/2
9/2	Kota Mutiara	Mackintosh	Dammam	16/2
10/2	Satguru	Link Ship	Dubai; Sharjah	15/2
14/2	CMB Energy (N. Sheva)	C.M.B.	Dubai; Abu Dhabi; Bahrain; Kuwait; Dammam; Doha;. (Carting at Kalamboli).	16/2
12/2	Seacrest Achiever (V-207)	Parekh/	Muscat; Dubai; Sharjah; Abu Dhabi; Bahrain; Dammam; Kuwait; Baghdad. (Carting at Hay Bunder No. 4).	17/2
		Merzario/	Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Dammam; Kuwait; Bahrain. (Carting at 14-VD for Merzario).	
		L. Triest/	Dubai; Dammam; Riyadh; Muscat; Abu Dhabi; Doha; Kuwait; Bahrain. (Carting at 171/173 Cotton Depot for L. Triest).	
		Seaspeed/	Dubai; Dammam; Bahrain; Kuwait; Doha. (Carting at H.B. No. 5).	
		Sai Ship/	Dubai; Muscat; Sharjah; Abu Dhabi. (Carting at W.B. No. 3).	
		Killick/	Dubai; Dammam; Riyadh; Bahrain; Kuwait. (Carting at M-178/180 (Cotton Depot).	
		U.L.A.	Dubai; Kuwait; Bahrain; Riyadh; Abu Dhabi; Doha. (Carting at 14-VD).	

(1)	(2)	(3)	(4)	(5)
14/2	Maersk Clementine	V. Fleming	Dubai; Dammam; Muscat; Bahrain; Kuwait; Riyadh; Doha. (Carting at M.O.D. No. 2).	18/2
8/2	Rossana	Mackintosh	Dubai; Muscat. (Carting at 7-VD).	15/2
8/2	Global Exp.	Sai Ship	Dubai; Dammam. (Carting at W.B. No. 3).	10/2
14/2	Vishva Nandini (Ind)	S.C.I.	P. Louis; Mombasa; Dar Es Salaam; Beira (Direct) and Inland Destinations in E. Africa. (Carting at T.P. No. 1).	22/2
15/2	Banglar Moni (Voy-7)	Sai Ship	Mombasa; Dar Es Salaam. (Carting at Wadi Bunder No. 3).	18/2
14/2	CMB Energy (N. Sheva)	C.M.B.	Dar Es Salaam; Mombasa (Direct); Nacala; Tanga; Kampala; Blantyre; Lusaka; Ndola; Matwara; Lilongwe and all Inland destinations in East Africa. (Carting at Kalamboli).	16/2
20/2	Menkar (V-02) (Br)	Arebee/	Dar Es Salaam & Mombasa (Direct); Kampala; Jinja; Toronto; Lugazi; Entebee (Uganda); Kigali; (Rwanda); Kitwe; Lusaka; Ndola (Zambia); Lilongwe; Blantyre (Malawi); Maputo; Zanzibar. (Carting at M.J.C.D.).	22/2
		P&I	Mombasa; Dar Es Salaam (Direct); Beira; Mahe & Inland Destinations in East Africa. (Carting at Timber Pond No. 4).	
24/2	Hoegh Dene (Br)	Patvolk	Montreal & Toronto via Halifax; New York; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans; & FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5).	28/2
12/2	Uni Pioneer (Voy-023)	Greenways	New York; Newark; Baltimore; Charleston; New Orleans; Houston; Boston; Providence; (RI); Philadelphia; Norfolk; Savannah; Jacksonville; Wilmington; Miami; Montreal; Toronto; Bermuda; Los Angeles; Longbeach; San Francisco; Oakland; San Diego; Stockton; Richmond; Almeida; Redwood City; Sacramento; Seattle; Portland; Vancouver (B.C.); Tacoma; Longview; Chicago; Dallas; Various inland destinations and Caribbean ports. (Carting at G/H Cotton Depot).	17/2
14/2	Maersk Clementine (Sing) (V-9004)	Volkart Fleming	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chicago; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit; Minneapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; San Francisco; Portland; Longbeach; Mexican and S. American ports. (Carting at M.O.D. No. 2).	18/2
12/2	Seacrest Achiever (Voy-207)	Seaspeed	New York; Baltimore; Norfolk; Savannah; Charleston; Houston & S. American ports. (Carting at Hay Bunder No. 5).	17/2
18/2	Medipas Bay	Samrat/ Hindustan/ L. Triest	Boston; New York; Baltimore; Norfolk; Charleston; P. Mouth; P. Lauderdale; Miami; New Orleans; Savannah; Jacksonvile; P. Everglades; Philadelphia; Halifax; Montreal; Toronto & S. American ports. (Carting at M-171/173 Cotton Depot for L. Triest) (Carting at M.O.D. No. 1 for Samrat and Hindustan).	22/2
14/2	CMB Energy (N. Sheva)	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans; Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli).	16/2
14/2	Maersk Clementine	V. Fleming	Lagos/Apapa; Dakar; Freetown; Monrovia; Lome; Cotonou; Douala; Tema. (Carting at M.O.D. No. 2).	18/2
12/2	Seacrest Achiever.	Seaspeed	West African ports. (Carting at Hay Bunder No. 5)	17/2
18/2	Medipas Bay	L. Triest	With T.P. Lagos/Apapa; Abidjan; Dakar; Duala; Cotonou; Nouakchott; Libreville; Tema; Matadi; Konakry; Freetown. (Carting at 171/173 C.D.).	22/2
14/2	CMB Energy (N. Sheva)	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema; via Antwerp. (Carting at Kalamboli)	16/2
9/2	Birgit Naber	Merzario	Dakar; Abidjan; Monrovia; Lome; Douala; P. Noire; Matadi; Libreville; Cotonou; P. Gentil; Lagos; P. Harcourt; Warri; Freetown Conakry; Louanda; Nouakchott; Guinea; Blassa. (Cartng at M.O.D. No. 2).	17/2

VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Seamer's Name	Agents	From
14/2	CMB Energy (Nhava Sheva)	C.M.B.	U.K. Cont./U.S./Med. Ports.
24/2	Hoegh Dene	Patvolk	U.S.A.
15/2	Ibn Abdoun	Transworld	S. America
26/2	Ind Renown	I.S.S. Co.	U.K. Cont.
22/2	Link Target	I.S.S. Co.	U.K. Cont.
12/2	Lanka Amitha	Seahorse	U.K. Cont.
18/2	Medipas Bay	L. Triest/Hindustan	Med. Ports.
20/2	Ming Winter	S.W. & Co.	U.S./Canada
14/2	Nortween Berina	Sai Ship	U.K. Cont.
25/2	Rumija	S.C.I.	U.K. Cont.
19/2	S/o. Orissa	S.C.I.	U.K. Cont.
15/2	Sidi Krier	Sai Ship	Yugoslavia
26/2	Tibor Szamuely (V-106)	Transocean	Russia & E. Europe
14/2	Vishva Nandini	S.C.I.	E. Africa

ATTENTION ALL READERS

PLEASE LET US KNOW WHAT NEW FEATURES YOU WOULD LIKE US TO INCORPORATE OR WHICH FEATURES YOU FIND REDUNDANT. YOUR PROMPT REPLY WILL BE HIGHLY APPRECIATED.

Address all letters to

The Editor

CHEMICAL WEEKLY

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HELP US TO SERVE YOU BETTER

Materials Exported

DRUG MATERIALS EXPORTED MADRAS
(From 15.11.89 to 20.11.89)
(Continued from previous issue)

IBUPROFEN BP 80: To Thailand: Shasun Drugs Ltd., 1,000 Kgs., Rs. 2,49,053.

IBUPROFEN USP/BP 88: To USA: Cheminor Drugs Ltd., 10,000 Kgs., Rs. 24,78,242.

ISONIAZID BP 80: To Belgium: Pradeep Drug Co., 3,000 Kgs., Rs. 4,46,400.

MEBENDAZOLE USP XXI: To Denmark: Pradeep Drug Co., 500 Kgs., Rs. 2,26,200; To Singapore: Pradeep Drug Co., 300 Kgs., Rs. 1,33,500.

MATERIALS EXPORTED MADRAS
(From 22.11.89 to 30.11.89)

ALUMINA CALCINED: To Hungary: The Madras Aluminium Co. Ltd., 30,00,000 Kgs., Rs. 2,52,41,902.

BARIUM CARBONATE: To Tokyo: Travancore Chem & Mfg. Co. Ltd., 36,000 Kgs., Rs. 1,94,887.

HYDROGEN PEROXIDE: To Malaysia: Asian Peroxides Ltd., 17,010 Kgs., Rs. 1,53,235.

L-CYSTINE: To FRG: Srinivas Cystine Ltd., 7,000 Kgs., Rs. 19,22,489.

L-TYROSINE: To FRG: Srinivasa Cystine Ltd., 1,500 Kgs., Rs. 3,31,053.

SODIUM HYDROSULPHATE: To Austria: Tamil Nadu Chemicals P. Ltd., 16,800 Kgs., Rs. 2,74,430.

DRUG MATERIALS EXPORTED MADRAS
(From 22.11.89 to 30.11.89)

ERYTHROMYCIN ESTOLATE BP 88: To FRG: Pradeep Drug Co., 100 Kgs., Rs. 87,000.

ERYTHROMYCIN STEARATE: To Thailand: Pradeep Drug Co., 300 Kgs., Rs. 2,72,000.

ERYTHROMYCIN STEARATE BP 88: To FRG: Pradeep Drug Co., 900 Kgs., Rs. 7,20,000.

SULPHAMETHOXAZOLE BP 88: To FRG: Plant Organics Ltd., 8,500 Kgs., Rs. 18,30,816.

TRIMETHOPRIM BP 88: To FRG: Adithya Export P. Ltd., 1,000 Kgs., Rs. 4,90,000; To Hamburg: Inventaa Chemicals P. Ltd., 2,000 Kgs., Rs. 10,13,973.

MATERIALS IMPORTED BOMBAY
1.12.89

ACRYLAMIDE: From Japan: Chemical Inds., 3,750 Kgs., Rs. 95,367; J.M. Chemicals Inds., 11.25 MTs., Rs. 2,86,101; Shri Radha Krishna Dye Chem P. Ltd., 2,000 Kgs., Rs. 56,862; Swan Products, 4,000 Kgs., Rs. 1,01,725; Vipul Indl. Products, 2,000 Kgs., Rs. 50,863.

ALDRIN TECH.: From USA: Gujarat Agro Inds. Corpn., 11,100 Kgs., Rs. 1,46,469.

ALUMINIUM HYDROXIDE POWDER: From FRG: Bles Ltd., 2,240 Kgs., Rs. 4,12,410.

DL-2-AMINO 1-BUTANOL: From FRG: Medchl Chemicals & Pharmaceutical P. Ltd., 7,020 Kgs., Rs. 11,30,672.

ANILINE OIL: From UK: Polyolefins Inds. Ltd., 36 MTs., Rs. 6,86,644.

AROMATIC CHEMICALS: From France: Hindustan Lever Ltd., 30 Kgs., Rs. 12,927; From FRG: Rishabh & Co., 800 Kgs., Rs. 96,948; From Switzerland: Intl. Health Care Products, 200 Kgs., Rs. 1,86,346.

BUTYL GLYCOL: From USA: National Sales Agency, 22,200 Kgs., Rs. 3,01,107.

CARBON BLACK: From FRG: Creative Polymers P. Ltd., 860 Kgs., Rs. 62,541; JBA Printing Inks Ltd., 500 Kgs., Rs. 15,565.

2-CYANOPYRAZINE: From Japan:

Jebco Pharma P. Ltd., 1,000 Kgs., Rs. 5,62,773.

DIETHYL CARBONATE: From France: Ranbaxy Labs Ltd., 3,960 Kgs., Rs. 1,92,463.

2,6-DIETHYL ANILINE: From Belgium: Gujarat Narmada Valley Co., 43.3 MTs., Rs. 21,66,638.

DIETHYLENE GLYCOL: From Netherlands: Refnol Oil Refineries P. Ltd., 18.4 MTs., Rs. 2,26,846; From Saudi Arabia: Reliance Inds. Ltd., 64.8 MTs., Rs. 6,04,246.

2,4-DIFLUORONITROBENZENE PURITY MIN. 98%: From UK: F.D.C. Ltd., 7,500 Kgs., Rs. 3,47,602.

DIMETHYL ACETAMIDE: From USA: Garware Plastics & Polyester Ltd., 14,043 Kgs., Rs. 3,57,145.

N,N-DIMETHYL FORMAMIDE: From USA: IPCL, 19,661 Kgs., Rs. 35,09,479.

DIPHENYLAMINE: From USA: HBR Chemicals P. Ltd., 8,273 Kgs., Rs. 3,22,625.

N-ETHYL-O-TOLUIDINE: From Japan: S.G. Pharm, 2,090 Kgs., Rs. 3,99,795.

GAMMA FERRIC OXIDE: From USA: Garware Plastics & Polyester, 2,000 Lbs., Rs. 5,42,532.

FURFURYL ALCOHOL: From Belgium: Ranbaxy Labs. Ltd., 2,640 Kgs., Rs. 81,685.

GALLIC ACID MONOHYDRATE MIN. 90%: From China: Sucham Labs., 200 Kgs., Rs. 2,06,341.

HYDRAZINE HYDRATE: From Japan: Hindustan Ciba Geigy Ltd., 3,000 Kgs., Rs. 1,32,243.

IODINE CRUDE: From Japan: Pharmachem Labs., 1,000 Kgs., Rs. 3,30,484.

IMIDAZOLE: From FRG: F.D.C. Ltd., 30 Kgs., Rs. 39,672.

L-BASE: From China: Umedica Labs P. Ltd., 1,000 Kgs., Rs. 8,01,658.

L-LYSINE MONO HCL USP: From Japan: NR Jet Pharmls Ltd., 500 Kgs., Rs. 45,174.

MANCOZEB TECH: From Netherlands: Northern Minerals Ltd., 3,600 Kgs., Rs. 12,33,819.

METHYL CHLOROFORMATE: From USA: JKBM Ltd., 15.186 MTs., Rs. 3,11,811.

METHYL ETHYL PYRIDINE: From Switzerland: Roche Products Ltd., 1,080 Kgs., Rs. 1,06,156.

METHYL PARATHION: From GDR: Kamadhenu Pesticides, 16,120 Kgs., Rs. 5,52,191; Rallis India Ltd., 1,612 Kgs., Rs. 5,52,191.

MONO ETHYLENE GLYCOL: From Saudi Arabia: Reliance Inds. Ltd., 3,001.509 MTs., Rs. 3,82,50,472.

OCTOIC ACID: From FRG: Aman Enterprises, 7,215 Kgs., Rs. 1,20,323.

PARA OCTYL PHENOL: From Japan: Bakelite Hylam Ltd., 1,400 Kgs., Rs. 3,20,433.

PARAFORMALDEHYDE 91% PRILLS: From Spain: Chemical Inds., 570 Kgs., Rs. 46,396; Dujodwala Resins & Terpenes, 18 MTs., Rs. 1,43,433; Verb Chemicals Inds., 800 Kgs., Rs. 65,104.

PIVALOYL CHLORIDE: From France: Gujarat Lyka Organics Ltd., 3,060 Kgs., Rs. 2,14,641.

POT. ALUMINIUM FLUORIDE POWDER: From UK: Greaves Foseco Ltd., 5,927 Kgs., Rs. 63,019.

POTASSIUM CARBONATE GRANULAR 99% PURITY: From Japan: G. Amphray Labs, 1,750 Kgs., Rs. 1,89,887.

PROPIONIC ACID: From FRG: M. Patwari Traders P. Ltd., 1,680 Kgs., Rs. 3,16,665.

PROPYLENE GLYCOL USP: From Singapore: Tata Exports Ltd., 16,770

Kgs., Rs. 3,66,774; From USA: Gujarat State Export Corpn., 22,360 Kgs., Rs. 4,89,032.

SODIUM FORMALDEHYDE SULPHOXYLATE: From China: Harkab Holdings P. Ltd., 16 MTs., Rs. 2,54,408.

SODIUM MONOFLUORO PHOSPHATE: From Japan: Choice Labs., 6.225 MTs., Rs. 2,42,741.

SOYA LECITHIN: From USA: Alembic Chemical Works Co. Ltd., 200 Lbs., Rs. 16,175.

TITANIUM DIOXIDE: From Japan: Asian Paints India Ltd., 1,700 Kgs., Rs. 7,78,195; From Netherlands: Keshavlal Talakchand & Co., 20 MTs., Rs. 11,86,789; From Norway: Metro Paint Industries, 10,000 Kgs., Rs. 5,05,233.

TRICHLOROETHYLENE: From Japan: Gupta Trading Co., 1,650 Kgs., Rs. 1,54,959.

TRIMETHYL PROPANE: From Sweden: Rand Polyproducts P. Ltd., 500 Kgs., Rs. 16,899.

3,4,5 TRIMETHOXY BENZOIC ACID: From Hungary: Burroughs Wellcome India Ltd., 3,900 Kgs., Rs. 6,81,047.

PLASTIC MATERIALS IMPORTED BOMBAY 1.12.89

HDPE: From Saudi Arabia: Amrita Moulding P. Ltd., 17.15 MTs., Rs. 2,09,350; Multi Layer, 17.55 MTs., Rs. 2,23,888; Plasto Meta Chem I. P. Ltd., 15.425 MTs., Rs. 1,58,373; Progressive Trading Company, 46.5 MTs., Rs. 5,74,872; Transworld Polymers Ltd., 17,150 Kgs., Rs. 2,09,350.

POLYPROPYLENE: From Australia: Kay Polyplast Ltd., 48 MTs., Rs. 5,85,935; From Brazil: Gilt Pack Ltd., 60 MTs., Rs. 8,66,174; From UK: Jaggy Indusrial Plastics, 28 MTs., Rs. 3,51,290.

POLYSTYRENE: From Korea: Asian Advertisers, 17 MTs., Rs. 2,56,516; Harkab Holding P. Ltd., 17 MTs., Rs. 2,50,073; Manav Intl., 17 MTs., Rs. 2,54,750; Mehta Traders, 51 MTs., Rs. 7,50,690; Videocon Intl. Ltd., 51 MTs., Rs. 8,08,720.

PVC RESIN: From Brazil: Monika Plastic Pipes (P) Ltd., 27.5 MTs., Rs. 7,24,468; Rita Roofing Ltd., 100 MTs., Rs. 12,40,544; Shree Shakago Comm. & Ind., 100 MTs., Rs. 12,43,091; Universal Pipes P. Ltd., 100 MTs., Rs. 14,45,470; Vinyl Products, 185.5 MTs., Rs. 50,61,231; From FRG: The Hukamchand Mills Ltd., 5 MTs., Rs. 1,17,849.

PVC RESIN: From Korea: Caprihans India Ltd., 50 MTs., Rs. 7,61,982; From Mexico: Auto Plast, 49.95 MTs., Rs. 6,03,220; Gujarat State Export Corpn. Ltd., 16.65 MTs., Rs. 2,03,860; Southern Blow Moulders, 33.3 MTs., Rs. 4,09,028; From Taiwan: Chemoplast, 21 MTs., Rs. 3,93,325; Maruthi Plastic P. Ltd., 31 MTs., Rs. 3,78,286; The Supreme Inds. Ltd., 77.5 MTs., Rs. 9,42,780; From Yugoslavia: Visina Sales P. Ltd., 10 MTs., Rs. 2,02,576.

DRUG MATERIALS IMPORTED BOMBAY 1.12.89

MORPHOLINE: From UK: Bayer India Ltd., 32,760 Kgs., Rs. 12,40,367.

D-PANTHENOL USP: From Japan: Rallis India Ltd., 600 Kgs., Rs. 1,69,598.

PENICILLIN G POTASSIUM: From Netherlands: Gujarat Lyka Organics, 6,330 Kgs., Rs. 27,12,663.

PYRIDOXINE HCl BP/USP: From FRG: Biological E. Ltd., 175 Kgs., Rs. 1,09,778.

SULPHADIAZINE BP 80: From China: Hindustan Ciba Geigy Ltd., 1,350 Kgs., Rs. 3,20,433; Nobel Chemie, 500 Kgs., Rs. 1,18,202.

MATERIALS IMPORTED BOMBAY (From 21.12.89 to 27.12.89)

ACRYLAMIDE: From Japan: Arjyot Chemicals P. Ltd., 50 MTs., Rs. 1,27,156; Inter Continental Inds., 40 MTs., Rs. 1,01,725; J.M. Chemical Inds., 11,250 Kgs., Rs. 2,86,812; Modern Chemical Works, 2,040 Kgs., Rs. 55,382.

ACRYLIC ACID 98%: From Japan: Indofil Chemical Co., 2,000 Kgs., Rs. 64,195.

ACRYLIC ACID: From Japan: Asian Paints Ltd., 600 Kgs., Rs. 1,93,062; Vipul Indl. Products, 3,000 Kgs., Rs. 96,531.

AEROSIL 20: From Belgium: Sebro Art Printers, 3,720 Kgs., Rs. 4,17,208; Ultim Pharmaceuticals, 1,860 Kgs., Rs. 1,92,731.

ALDRIN TECH.: From Netherlands: Gayatri Pestichem Mfg. P. Ltd., 22,800 Kgs., Rs. 27,42,916.

ALUMINIUM CHLORIDE: From FRG: Serum Inst. Of India Ltd., 2,000 Kgs., Rs. 88,791.

ALUMINIUM OXIDE: From FRG: Ece Inds. Ltd., 250 Kgs., Rs. 49,100.

ALUMINIUM OXIDE SYNTHETIC: From USA: Grindwell Norton Ltd., 2,495 Kgs., Rs. 1,63,876.

ANILINE OIL: From UK: Ascent Trading Co., 16,080 Kgs., Rs. 2,90,343; C.J. Shah & Co., 1,920 Kgs., Rs. 3,54,816.

AROMATIC CHEMICALS: From FRG: Indl. Perfumes Ltd., NA, Rs. 1,34,782; 50 Kgs., Rs. 1,34,782; Sai Aromas P. Ltd., 18,216 Kgs., Rs. 4,02,060; From USA: Indl. Perfumes Ltd., 400 Lbs., Rs. 45,837.

BENZALDEHYDE: From USA: Arlabs Ltd., 16,800 Kgs., Rs. 4,46,294.

BISPHENOL A: From Japan: Shriji Chemicals, 5,000 Kgs., Rs. 1,56,826; From Mexico: Asian Paints Ltd., 8,000 Kgs., Rs. 2,10,753.

1,4-BUTANE DIOL: From USA: Excel Inds. Ltd., 32,749 Kgs., Rs. 24,43,086.

C-ACID: From Japan: Sudarshan Chemical Inds. Ltd., 1,280 Kgs., Rs. 8,21,692.

CALCIUM BORIDE 56.8%: From FRG: Greaves Foseco Ltd., 250 Kgs., Rs. 1,01,337.

CALCIUM FLUORO PHOSPHATE: From USA: Ganga Phosphorous & Chemicals Ltd., 2,960 Kgs., Rs. 21,27,812.

CAPROLACTAM: From Belgium: Garware Nylons Ltd., 1,24,250 Kgs., Rs. 36,95,614; From Netherlands: NRC Ltd., 2,040 MTs., Rs. 60,67,649; From Spain: Modipon Fibres Co., 5,00,000 Kgs., Rs. 1,38,35,117; From USA: Garware Nylons Ltd., 125 MTs., Rs. 32,93,016.

CETYL ALCOHOL: From France: Dilipkumar & Co., 3,000 Kgs., Rs. 93,810.

2-CHLORO ETHYL PHOSPHATE: From UK: Expanded Incorp., 12.5 MTs., Rs. 40,826.

CHROMIUM OXIDE: From Italy: Regency Ceramics Ltd., 3,500 Kgs., Rs. 4,55,490.

CITRIC ACID: From China: D.R. Corpn., 60 MTs., Rs. 7,69,929.

CITRIC ACID MONOHYDRATE BP: From China: Easyterm Enterprises, 17.5 MTs., Rs. 2,89,998.

CROTONIC ACID: From FRG: S.G. Pharmls., 1,080 Kgs., Rs. 1,28,124.

2-CYANOPYRAZINE 99%: From Japan: Suchem Labs., 800 Kgs., Rs. 4,64,104.

CYANURIC CHLORIDE: From FRG: Aroma Synthetic Inds., 500 Kgs.,

Rs. 26,541; Akash Purochem P. Ltd., NA, Rs. 53,082; Ami Chemicals, 2,000 kgs., Rs. 1,06,163; Apex Dyestuff Inds., 500 Kgs., Rs. 26,541; Ashok Chemical, 500 Kgs., Rs. 26,541; Ashwini Dye Chem Inds., 1,000 Kgs., Rs. 53,082; Asian Dyestuff Inds., 1,000 Kgs., Rs. 53,082; Atevt Chemical Inds., 500 Kgs., Rs. 26,541; Atlas Dye Chem Inds., 1,000 Kgs., Rs. 53,082; Bhavani Dyechem Inds., 1,00 Kgs., Rs. 53,082; Castle Enterprises, 500 Kgs., Rs. 26,541; Chemiequip Intermediates, 1,000 Kgs., Rs. 53,082; Indodyes Chemicals Inds., 2,000 Kgs., Rs. 1,06,163; Jay Dye Chem Inds., 500 Kgs., Rs. 26,541; Kaushal Chemicals, 1,000 Kgs., Rs. 53,082; Khyati Chemical Inds., 500 Kgs., Rs. 26,541; Laxmi Traders, 1,000 Kgs., Rs. 53,082; Mangalam Chemicals, 500 Kgs., Rs. 26,541; Meghani Dyes & Intermediates, 1,000 Kgs., Rs. 53,082; Mohita Dye Chem P. Ltd., 1,000 Kgs., Rs. 53,082; Organo Chemicals Inds., 1,000 Kgs., Rs. 53,082; Radha Dye Chem, 1,000 Kgs., Rs. 53,082; Shyam Dye Chem P. Ltd., 500 Kgs., Rs. 26,541; Sita Chemicals P. Ltd., 500 Kgs., Rs. 26,541; Supreme Chemicals, 500 Kgs., Rs. 26,541; Vibgyor Colour Co. P. Ltd., 500 Kgs., Rs. 26,541.

DIETHYL SULPHATE: From Japan: Ahmedabad Chemicals P. Ltd., 15,640 Kgs., Rs. 3,33,010; Jaysynth Dyechem Ltd., 15.64 MTs., Rs. 3,43,402.

DIMETHYL CARBONATE: From FRG: HOC Ltd., 150 Ltrs., Rs. 4[illegible]87.

DIMETHYL ALLYL AMMONIUM CHLORIDE: From USA: Hico Products Ltd., 2,350 Lbs., Rs. 53,921.

DIMETHYL SULPHOXIDE: From France: Bombay Drug House P. Ltd., 4,620 Kgs., Rs. 1,27,207; Orex Pharma P. Ltd., 7,919 Kgs., Rs. 3,58,319; Ranbax, Labs Ltd., NA, Rs. 4,56,859.

DIPHENYL METHANE DIISOCYANATE: From FRG: Gargi Metallurgical Corpn., 18 MTs., Rs. 6,86,643.

4,4-DIPHENYL METHANE DIISOCYANATE: From FRG: Expanded Incorpn., 1,800 Kgs., Rs. 67,305.

EPICHLOROHYDRINE 99% MIN.: From Hong Kong: Hasmukhray & Co., 4,808 Kgs., Rs. 1,27,987; From Japan: Cibatul Ltd., 63,360 Kgs., Rs. 17,01,471.

EPICHLOROHYDRINE 99% PURITY: From Japan: German Remedies Ltd., 19,200 Kgs., Rs. 55,338.

ETHYL ALCOHOL: From USA: Franco-India Pharm, 9,880 Kgs., Rs. 2,61,507; Uttamlal Export Ltd., 5,320 Kgs., Rs. 1,08,236.

GAMMA FERRIC OXIDE: From Japan: Straw Products Ltd., 1,600 Kgs., Rs. 8,40,926; From USA: Letape India P. Ltd., 499.57 Kgs., Rs. 1,22,661.

GALLIC ACID: From FRG: Ven Petrochem & Pharma (I) P. Ltd., 5,000 Kgs., Rs. 5,05,637.

GLYOXYLLIC ACID METHYL ESTER: From Austria: Sudershan Chemical Inds., 1,100 Kgs., Rs. 54,674.

ISOBUTYL BENZENE: From China: Sekhsaria Chemicals Ltd., 1.02 MTs., Rs. 46,692.

ISOPHTHALIC ACID: From USA: Khandelwal Resins & Polymers, 1,575 Lbs., Rs. 1,14,822; Refnol Oil Refineries P. Ltd., 16,36 MTs., Rs. 2,58,594; Satyen Chemical Inds., 8,165 Kgs., Rs. 1,27,672.

ISOPROPYL ALCOHOL: From Taiwan: Arlabs Ltd., 12.8 MTs., Rs. 1,54,079.

IODINE: From Japan: Micron Labs., 1,000 Kgs., Rs. 3,19,529.

IODINE CRUDE: From FRG: Eskay Fine Chemicals, 2,000 Kgs., Rs. 6,09,366.

IODINE CRUDE 99.5% MIN.: From Japan: Lub Chem, 1,500 Kgs., Rs. 4,65,391.

LINALOOL SP.: From USA: Indl. Perfumes Ltd., 65,320 Kgs.,

Rs. 8,55,026.

2,6-LUTIDINE: From Japan: Cepham Labs Ltd., 740 Kgs., Rs. 1,69,162.

L-LYSINE MONO HCL USP: From Korea: Geno Pharm. Ltd., 2,000 Kgs., Rs. 2,03,450.

2-MERCAPTO BENZIMIDAZOLE: From Japan: Nirlon Synthetic Fibres & Chem. Ltd., 4,500 Kgs., Rs. 13,69,912.

META PHENYLENE DIAMINE: From Belgium: Jaysynth Dyechem Ltd., 5 MTs., Rs. 4,96,362.

DL-METHIONINE: From Japan: Agvet Inds., 2,400 Kgs., Rs. 10,23,690.

METHYL GLYCOL: From USA: Cibatul Ltd., 1,800 Kgs., Rs. 3,60,636.

N-METHYL 2,2-CHLOROACETO ACETAMIDE: From FRG: Khatau Junker Ltd., NA, Rs. 16,40,035.

MOLYBDENUM TRIOXIDE: From Japan: Sudarshan Chemical Inds., 1,000 Kgs., Rs. 1,27,641.

MONO METHYL ACETO ACETAMIDE: From FRG: Sudarshan Chemical Inds., 3,192 Kgs., Rs. 9,95,056.

1,4-NAPHTHAQUINONE: From Japan: P.G. Chemicals P. Ltd., 250 Kgs., Rs. 2,27,356.

PARAFORMALDEHYDE 96% PRILLS: From Spain: Goodlass Nerolac Paints Ltd., 16 MTs., Rs. 1,49,196.

PERCHLORO ETHYLENE: From Belgium: Beauty Art and Cleaners P. Ltd., 20,460 Kgs., Rs. 1,66,916; From Spain: Scottish Chem. Ind., 19.22 MTs., Rs. 1,61,300.

D(-)ALPHA PHENYL GLYCINE BASE: From Netherlands: TTK Chemicals Ltd., 3,000 Kgs., Rs. 8,47,912.

D(-)ALPHA PHENYL GLYCINE CHLORIDE HCL: From Spain: Concord Pharm Ltd., 6,440 Kgs., Rs. 26,19,962; Ranbaxy Labs Ltd., 6,440 Kgs., Rs. 2,49,130.

PHENYL PROPANOLAMINE HCL USP: From Japan: Wander Ltd., 200 Kgs., Rs. 75,013.

POLYVINYL ALCOHOL: From FRG: Rosy Chemicals, 750 Kgs., Rs. 50,030.

POLYVINYL PYRROLIDONE: From FRG: Cadila Antibiotics P. Ltd., 400 Kgs., Rs. 85,386.

POTASSIUM CARBONATE 99% PURITY: From Japan: G. Amphray Labs., 17,500 Kgs., Rs. 1,90,358.

POT. PERMANGANATE: From Netherlands: Nikeon Corpn., 1,633 Kgs., Rs. 24,663.

PROPYLENE GLYCOL USP: From Netherlands: Lupin Labs Ltd., 34,400 Kgs., Rs. 7,01,606; From USA: Bakelite Hylam Ltd., 33.54 MTs., Rs. 6,53,938; The General Import Co., 11,180 Kgs., Rs. 2,17,178.

Edited by R. Raghavan and published by N.R. Rajagopalan on behalf of owners, Sevak Publications, 306, Shri Hanuman Industrial Estate, Wadala, Bombay-400 031. Madras Office : 27, Begum Sahib 3rd Street, 1st Floor, Mount Road, Madras 600 002. Phone : C/o 831808 and printed by N.R. Rajagopalan at Sevak Publications, 25, North Mada Street, Thiruvanmiyur, Madras 600 041. Phone : 419265. Registered with the Registrar of Newspapers for India vide No. R.N. 1972/57.

REGD. NO. TN/MS (C) 395 ISSN 0045/6500 R. N. NO. 1972/57

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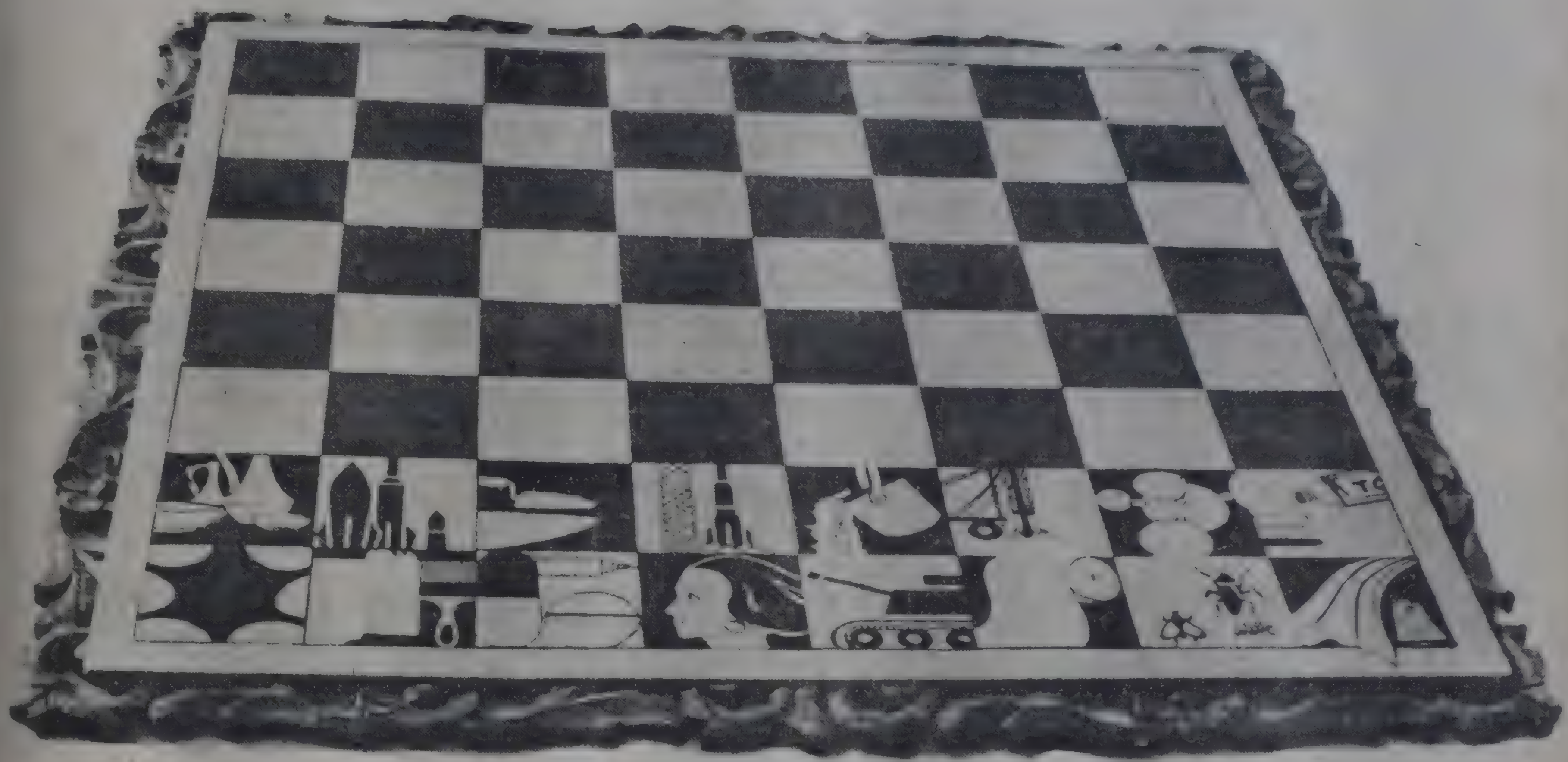
Chemical Weekly

VOL. XXXV | FEBRUARY 20, 1990 | NO. 24



CHEMICAL WEEKLY

VOL. XXXV FEBRUARY 20, 1990 NO. 24

HERALDING THE 21st CENTURY - 39

Impact of New Biology on Society

Bioengineering in Industry and Agriculture

People have throughout history domesticated various microbes by empirical selection of genetic variants with improved properties - for example, in making bread, wine, cheese, and antibiotics. Now, directed manipulation of genes through bioengineering can further improve strains.

A successful early application of the new biology has been the use of recombinant bacteria to produce mammallian proteins. One of the first was the human growth hormone, used to treat children who otherwise would not grow to normal stature. Another early product was bovine hormone to increase milk production in cows. A third was human insulin for the relatively rare diabetic people who are allergic to insulin derived from other animals. A more recent product is tissue plasminogen activator, to dissolve the blood clots that may cause coronary thrombosis or strokes.

With animals, the extent of possible alterations through genetic engineering may be limited because the traits one would wish to alter often involve a large number of undefined genes, rather than being determined by a single gene. With plants, somewhat more extensive changes may be likely. Promising possibilities include enhanced resistance to pests, drought, or temperature extremes, and changes in nutritive value and flavor. Currently, there is extensive research on the possibility of incorporating in various plants the set of genes responsible for nitrogen fixation, thus removing the need for expensive nitrogen fertilizer.

Technical problems have been encountered both in achieving strong expression of inserted genes even in bacteria, and in preventing destruction of the resulting proteins before they are harvested. Since genes can also be cloned in cultured mammalian cells and in yeast cells (which are more similar to mammalian cells than are bacteria), future production of mammalian proteins may well be shifted to these organisms. Moreover, though the knowledge of molecular genetics of higher plants is so far not well developed, it is conceivable that cloning into these organisms will eventually prove economical; some optimists suggest that a single field of corn could meet the world's need for insulin.

Some scientists hope that eventually it may be possible to preserve the DNA of rare species that are threatened with extinction. It has been suggested that inserting preserved DNA into the egg of an existing closely related species, or that related DNA might be modified for that purpose. These applications are speculative at present, but not beyond the realm of possibility.

One constitutional issue, that of patenting of engineering organisms, has been addressed Human Body and Brain Enhancement.

Gene therapy is aimed at curing well-defined hereditary diseases. But bioengineering might also theoretically be aimed at enhancing desired traits or creating new traits or new physical or mental capabilities. This possibility has often been raised in speculation and in fiction, with some scenarios going as far as the creation of superior and inferior classes of people.

In fact, the technical possibilities for significant enhancement through genetic engineering appear limited. Genetic manipulation in humans is likely to be restricted for a long time at least to addition or replacement of a single gene, and there are only a few known single genes with significant effects generally agreed to be desirable. If one assumes that the traits society might be tempted to enhance would be intelligence (or more precisely some aspect of intelligence), memory, strength, size, athletic ability or some other specialized talent, each involves a large and as yet undefined number of genes. Anyone attempting to manipulate such traits would be facing a formidable task.

For many years, however, neurobiologists have been studying conduction of electrical impulses along nerve fibres and the chemical transmission of impulses from one cell to many others. Specific functions in the brain have been identified and localized in specific regions. It has been known for some time that some hormones, distributed throughout the body, influence both physiology and behaviour. Now science is identifying a variety of neuropeptides, hormones that are released within the brain and modulate functions such as blood pressure and digestion. It is increasingly likely that neuropeptides will prove to be involved in controlling mood or emotions, although none have yet been shown specifically to do so under physiological conditions. It is even possible that a biochemical explanation may exist for violent, aggressive, or antisocial behaviours. Such knowledge could be expected to lead to medications or treatment for a range of conditions, such as emotional disorders; it could also lead to less beneficial forms of behaviour control or mind control. According to Dr. James L. McGaw, Director of the Center for the Neurobiology of Learning and Memory at the University of California, Irvine, "The basic science of neuropeptides and neurotransmitters...is exploding at the present time." Dr. Herbert Weingartener, Chief of Cognitive Studies at the National Institute of Mental Health, added, "We're sitting on a revolution that rivals quantum physics in the 1920s."

A second line of research is also leading to new theories and new knowledge about the genetic basis of mental and behavioural traits - the study of identical twins, including pairs that that were separated at birth by adoption. A series of studies at the University of Michigan has been widely reported; this research may provide clues for further genetic research. The molecular basis of memory is being worked out in simple animals. In higher animals analysis of the paths and mechanisms of communications between different regions within the brain is providing new insight into the ability of the brain to integrate informaton, much like a computer but with complex branching rather than more linear connections. There could be ways to enhance the functioning of these pathways and possibly the storage of information; already clinical tests of such chemical aids are underway.

Individuals appear to differ widely in the speed of the search-and-find processes in their brains that produce complex responses in their brains to an input of information. The molecular genetics of development suggests that one source of differences in this aspect of "general intelligence" might be differences among individuals in certain proteins of their synapses; whether these proteins can ever be "enhanced" is highly controversial at present. Advances in neurobiology will almost certainly have major impacts on the understanding and treatment of various mental illnesses. A better understanding of the role of bilogical factors and the role of social factors could eliminate unwarranted blame for mental illness tha has been attributed to the family environment or to othe aspects of society. Recent indications that genetic factors ma play a decisive role in some kinds of many depressive il ness have focused attention on biological factors in othe mental illnesses.

The brain, with its hundred billion or more cells and a thou sandfold greater number of connections, seems likely to pro vide a virtually endless challenge for molecular scientists Many people, however, may find that their discoveries, o even their hypotheses and research, are unsettling and dis turbing. They bring into question familiar assumptions abou human nature, responsibility and freedom, and basic equal ity among people.

The Control of Aging: The branch of biology with th most recalcitrant gaps between empirical description an molecular and analysis is developmental biology, or the stud of how cells and organisms mature and age. Scientists sti lack adequate knowledge of the mechanisms by which cell in a developing embryo differentiate, move, and relate t neighboring cells in an orderly way to yield a coherent se of organs. They do understand or are beginning to under stand some of the key features: how genes are selectivel turned on or off, how concentration gradients of chemical released by cells influence neighbouring cells, and how cell find and adhere to each other. They are still far from unde standing in detail how nerve fibers extending from specifi cells in the brain connect with other specific cells in othe brain regions. It is generally anticipated, however, that advan ces along these lines will now proceed rapidly and the result will be translated into major medical advances in the year ahead.

Despite the progress in cell biology, the basic mechanism of aging in higher organisms is not undersood - even in term of whether the key changes occur in genes, intracellular struc tures, membranes, blood vessels, the immune system, or al of these. The general increase in life span is a product o improvments in prevention and treatment of infectious an other diseases, as well as in nutrition and sanitation, rathe than a product of specific interference with the aging pro cess. If life were sufficiently prolonged, or aging and natura death sufficiently delayed, then the birth rate might need t be lowered to avoid problems of over-population. A lower ing of the birth rate might come about either by a genera consensus of individuals, by public policy intervention, o by some natural adaptation. Such interference does not seen to be in sight now, but if it comes about it could radicall alter the normal process of generations with major social con sequences.

-- T.P.S. RAJA

(Source: Biology and Bill of Rights Office Technolog Assessment, Impacts of Neuroscience, US Congress.)

CHEMARENA

.L. VENKITESWARAN

TPE - Thermoplastic Elastomers

TPE or thermoplastic elastomers have been under devel-ment for many years but not able to make a dent in the a of elastomers which are processed in a somewhat cir-itous molding process. The advantage of TPE would be ick and lower cost in processing into finished products like er thermoplastics. But the peculiarities of synthetic elas-mers requiring vulcanisation was a stumbling block. The velopment of types not needing the usual vulcanisation has l to higher usage. The TPEs now cover a wide range of operties challenging many applications other than auto-bile tyres. Shell Group is the world's leading producer with er 50% of the market and expanding production by 40% a level of 320,000 tonnes by 1991. Monsanto is also very tive. The type of TPS and estimated market for 1988 to 00 in USA is given in Table 1 alongside.

Table - 1

(in 1000 tonnes)

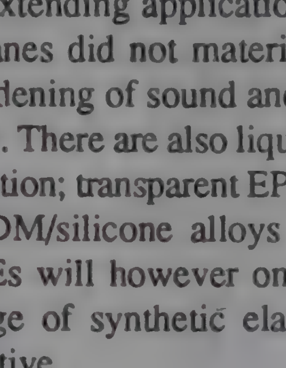
	1988	1993	2000
Styrenics	290	415	655
Olefinics	145	240	470
Polymethane	74	100	140
Polyester	34	55	90
Others	14	25	45
Total	**557**	**835**	**1400**

Improved technology to get tailor-made polymers to fit ecific requirements have helped the growth. Most usage for auto industry other than tyres. EPDM was a big step in extending application while the early promise of polymethanes did not materialise. One of the grades gives a big deadening of sound and is hence useful for inside fittings of cars. There are also liquid EPR for sealings, coatings, encapsulation; transparent EPR for windshields, glazings and some EPDM/silicone alloys -- all extending the range of uses. TPEs will however only continue as a supplement for the range of synthetic elastomers and not be a serious competitive.

Controlled release fertilisers

There is reportedly significant wastage of fertilisers along ith the irrigation or rain water runoff, more so with the more luble urea. Hence the use of a treatment to cut down on lubility and have a controlled release of the nitrogen. For-aldehyde is a useful chemical for such treatment but the actice in India is meagre and the added cost may be a dis-centive, more so for our mini farms. One of the better ways controlled release is sulphur coated ureas, SCU's used idely for turfs and lawns in USA or for nursery stock. SCU a form of encapsulation but at a low cost of about 7 cents r lb. Other methods of encapsulation is by polymers and sts between 50 cents and $1.50 per lb.

Sulphur coating is said to have some disadvantages such brittleness or microscopic defects in the coating but these uld be suitably adjusted or by waxy topcoat. Now methods e being studied for use of polymeric polysulfide. When sing molten sulphur it must flow rapidly and crystallise quickly to prevent agglomerations. Di alkyl polysulfides are useful -- butoxycarbonyl ethyl polysulphide - BCEPS - but costly. Now a different method is reported by Triozone Corporation with the use of patented heterocyclic organic nitrogen compounds such as syn-tetrahydrotriazone as per formula given alongside.



Triazone analogues are made by reacting urea or substituted urea, an aldehyde and ammonia or primary amine where all the ammonia or amine reacts leaving some unreacted urea in the solution. However all these are costly and not worth the efforts to save some urea. It is however necessary that we should develop and market larger quantites of formaldehyde modified slow release fertilisers and effect savings in the overall demand for nitrogenous fertilisers.

Towards an era without gasoline?

"New transportation fuels: a strategic approach to technological change" is the title of a book by Danial Sperling of University of California. Although US cars are so much an integral part of their lifestyle that it is treason to think in terms of life without cars, but hydrocarbon fuels for cars are set to diminish rapidly in the early decades of the 21st century and the questions arising from this cannot be ignored.

The author has some remarkable observations to make on alcohol fuels. He feels that but for the advent of low cost crude petroleum in abundance the automobile industry may have optimised designs for alcohol fuels derived from renewable feedstocks. In fact this was a theme in the UN agencies in the early fifties. A national network based on supplies of alcohol from thousands of dispersed units would have been established and the problems of auto emissions may not ha been acute. Subsequent advent of petroleum would have be resisted strongly as alcohol fuels are being resisted now spite of higher energy density. The high volatality, flan mability and explosivity would have strong arguments by t environment lobby against any widespread induction of ga oline. But that was not to be. Petroleum came over and esta lished its reign and now alcohol fuels are obliged to fig their case. There is tremendous economic and political ine tia in the transportation factor that precludes major poli shifts. May be the situation will shift in two decades and ne design vehicles optimised for non-petroleum fuels may con up. Oil from shale, coal-based fuels, methanol, compress natural gas (CNG), ethanol from biomass and even hydr gen may have a place in the decades ahead.

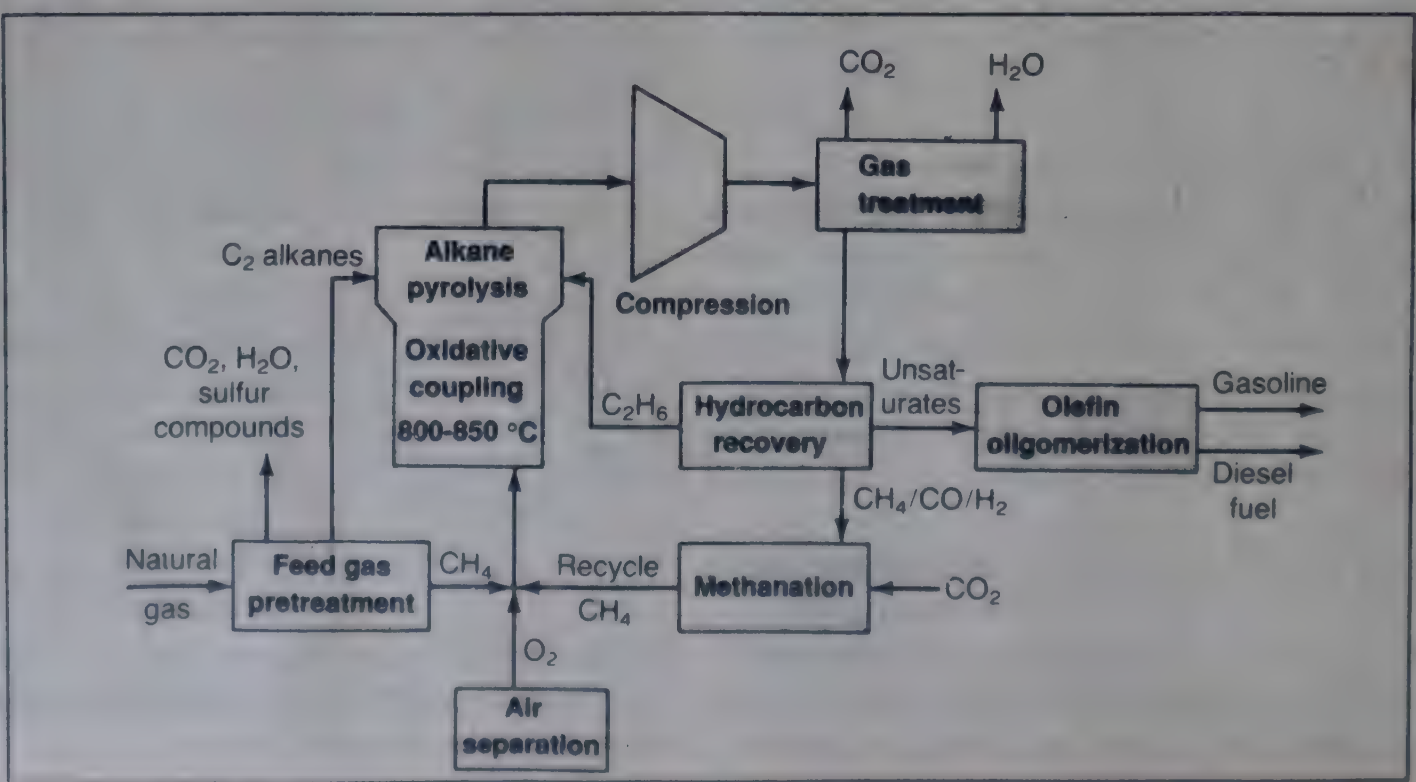
Methane Coupling

Increasing attention is being given to the oxidative coupling of methane to produce higher hydrocarbons and this appears to have been a subject at the recent PACIFICHEM 89 Conference. Arco Chemical Co. and CSIRO (Commonwealth Scientific and Research Organisation) of Australia have presented their efforts in this field. (*C.E. News*, of Jan. 22).

There are two approaches to coupling methane molecules to ethylene -- straight catalysis of methane/oxygen mixtures or cofeed approach and the redox approach which supplies oxygen through a metal oxide. The catalysts and conversion/selectivity factors would determine as to which approach succeeds. Arco have developed catalysts containing a variety of metals and other matrix components and some are unaffected by H_2S and remain stable and active at 900°C for long periods. They claim at 25% hydrocarbon conversion 4.9% ethylene and some propylene etc., not a promising one.

ARCO propose a GTG (gas to gasoline) process with oli omerisation of olefines to gasoline and claim process of $ per bbl for gasoline on redox system -- equivalent to $ to 32 per bbl of crude on a 12000 bbl per day conversic

CSIRO have looked at the design/engineering aspects f a project based on Australia's natural gas which has 64 methane and 35% of C_2 to C_6 alkanes. Their conceptu process is illustrated in the figure below. It has an oxidati coupling reactor after gas treatment and then oligomerisatic of the olefines formed. The per-pass conversion will restricted to 25/35% and unconverted gas recycled whic means oxygen has to be used to avoid nitrogen build up. The is also a pyrolitic conversion of higher alkanes and oper tion at 800-850°C under high exothermic conditions. It is tc early for cost data but gas to gasoline is going to play important role in the near future.



INDUSTRIAL ALCOHOL

Gujarat yet to lift levy

All States have begun implementing the Supreme Court judgement on industrial alcohol by scrapping duties under various heads, with the exception of Gujarat. Maharashtra has removed all levies save an administrative charge of twenty paise per litre, with effect from February 1. Uttar Pradesh has begun charging a composite levy of twenty-seven paise. Tamil Nadu has also reduced the duty to a nominal level. Following a High Court ruling, Andhra Pradesh has also done away with all levies on the material.

Gujarat is the only exception. The State continues to levy 50 paise per litre in defiance of the Supreme Court ruling. Two consumers in the State have gone to the court praying for implementation of the court ruling. The Gujarat units using alcohol as feedstock are upset over the State's refusal to abide by the ruling of the Supreme Court. The State is levying 50 paise per litre on alcohol distilled within the State. On alcohol brought to the State from other States, it is charging an "import duty" of 50 paise, which again contravenes the judgement.

The Gujarat-based units find their competitiveness eroding under the present situation. The impact of the 50 paise levy is all the more worrying because the alcohol price is the highest in the State. The per litre price is Rs. 4.28 in Gujarat, compared to Rs. 3.15 in Maharashtra and Rs. 2.60 in Uttar Pradesh.

Another grey area is sales tax. The Supreme Court ruling had explicitly disallowed the States from levying sales tax, ruling that industrial alcohol came under the exclusive jurisdiction of the Union Government but the States continue to levy the same. Maharashtra, in effect, charges four per cent sales tax. Gujarat is charging 7.5 per cent. Similarly, several States continue to levy import and export duties which again goes against the letter and spirit of the judgement.

SAIPEM-SNAM TO IMPLEMENT BOMBAY HIGH GAS LIFT PROJECT

After months of deliberations with the Union Finance Ministry, the Italian consortium of Saipem and Snam Progetti has finally decided to implement the Rs. 140-crore gas lift project in the Bombay High oil field, it is learnt. A senior official of Saipem in Bombay confirmed that all the paperwork and engineering preliminaries for the project would start next month, while actual construction would begin only after the monsoon. No further details were forthcoming, and Mr. Ottavino Quatrochi, the Delhi-based representative of the consortium in India, declined to comment on the matter.

The Saipem-led consortium, which was awarded a letter of intent for th project around July last year, had no been able to start work according to th original schedule as the modalities fo a $32 million Italian credit on soft term were pending finalisation. The term were finally negotiated and settled abou two weeks ago, according to sources i the Oil and Natural Gas Commissio (ONGC).

In fact, it was the offer of soft cred under the Indo-Italian bilateral assis tance programme that tilted the balanc in favour of the Saipem-Snam Proget consortium last year when the biddin process was on. Industry circles ha expected Essar Gujarat, the lowe bidder, to bag the contract at that tim Although details of the revised proje implementation schedule are not avai able, industry sources do not expect th original completion target of Decemb 1990 to be met. The project, which w help enhance recoveries at Bomba High by lifting of the oil and gas leve at existing platforms, is unlikely to b completed before May 1991, accordi to industry watchers.

PROF. J.V. BHAT MEMORIAL SEMINAR ON

Eradication of water-borne diseases: strategy for the 1990's

The second seminar to commemorate the birth anniversary of late Prof. J.V. Bhat, a doyen of Microbiology in India will be held on Saturday the 3rd March, 1990, at the New Auditorium of the University Department of Chemical Technology, Matunga, Bombay 400 019.

The seminar is being jointly organised by Prof. J.V. Bhat Memorial Committee alongwith Eureka Forbes Ltd. and the Association of Food Scientists and Technologists (India). The forenoon session will consist of presentation of papers for the "Prof. J.V. Bhat — Eureka Forbes Award" while the afternoon session will be addressed by eminent scientists and medical professionals lik Dr. (Ms.) Saroj Parekh, Pediatrician Bombay, Mr. S.R. Kshirsagar of Indian Water Works Association, Bom bay, Dr. John A. Lopes, Director o Technology, Microcide, Troy (USA The seminar will focus attention o relevant topics on health care an hygiene. An exhibition of related pro ducts and industries will also be orga nised simultaneously. The registratio fee is Rs. 75 per delegate. Fee conce sions to students will be given. F further details regarding the exhibitio and registration, contact immediatel Dr. M.Y. Kamat, Food & Fermenta tion Division, Department of Chem ical Technology., Matung Bombay-19. Phone: 4114302.

O.P. KHARBANDA

FRANKLY SPEAKING

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Rules of Thumb For Physical Scientists

This remarkable and unique title (Compiled by David J. Fisher, 303p, Trans Tech Publications, Switzerland, 1988) is just the type that I have been myself hoping to write for chemical engineers or for managers or for scientists in general. It certainly encourages me to go ahead, only I wonder what sort of response the title has attracted in the market place. The author himself has had reservations judging by the briefest of prefaces that I have ever seen (barely 100 words). This makes the valid points: Rules of thumb, though useful, cannot always be depended upon, hence not widely disseminated. They are, however, frequently proposed in the literature and can be extremely valuable — so long as the limitations are clearly understood by the users, they are a mere 'thumb rule', after all! Present compilation includes such rules as have been found particularly useful or surprising.

The somewhat longer and detailed introduction (3 1/4p) explains that this idiosyncratic reference work includes many intimate correlations between different properties and different substances. This was particularly inspired by: K.C. McNeil (Amer. J. of Phy. 1960 **28** 375) who suggested few simple relationships for predicting properties of copper and lead; also by the 'Back of the envelope' column by the one-time editor of the same journal, E.M. Purcell. The rules included here are from a host of sources which the compiler must have had to browse through since none of the abstracting sources seem to cover such items, for example chemical abstracts and Science Citation Index do not index words suc as 'rules' and not even likely synonyms such as 'correlatio or 'relationship' etc, let alone 'thumb'! What exactly qua fies as a 'thumb rule'? The compiler is quite frank to co fess that he included anything that he felt like including – as simple as that, hence his labelling the work as 'idiosy cratic'. The cover of the present paperback has a drawin to illustrate Wood's 3-part rule (NOT included in the tex Never draw what you can copy; Never copy what you ca trace; and never trace what you can cut out and paste dow Naturally most of the thumb rules, arranged alphabetical (but with an exhaustive and most useful permutated subje indices, one in order of the dependent variables and anoth alphabetically by independent variables) for A to Z, rela to physical sciences, many are of general nature. And to bri you a 'flavour of the subject here are a few:

Credibility rule: The first 90% of a (computer) progra accounts for 90% of the development time, the remaini 10% of the program accounts for the other 90% of the dev lopment time. Anti-Janitor rule: Scientists who work in el trically heated buildings should ignore the strident reque of caretakers to turn off incandescent light bulbs when r in use. Why? As converter of electrical energy to heat, inca descent light bulb is nearly 100% efficient, hence doin better job than any central heating system. Slide rule: (to t a slide for public presentation): If a slide is not readable w held at arms length, it will not be readable when projec from the back of a conference hall. 90-10 rule: In order find relevant data, 9 times as much additional irrelevant d will have to be brought into the main memory of a compu How true? To sum up, here is a 'gem' of a much needed co pilation, hopefully to be followed up in fields other than ph ical sciences. Any takers?

Dr. Kharbanda, a Fellow of the Institution of Chemical Engineers, is a visiting professor and an author of repute. His recent title: TAKEOVERS, MERGERS & ACQUISITIONS, (Kogan Page, 1988). Forthcoming titles: (All with Mr. E.A. Stallworthy) WASTE MANAGEMENT — TOWARDS A SUSTAINABLE SOCIETY (Gower, 1989) & PROJECT TEAMS — THE HUMAN ELEMENT (Ntl. Computing Centre, 1990). Available from Vivek Enterprises, 5, S.K. Barodawalla Marg, Bombay 400 026.

ANDLA-BHATINDA PETROLEUM PIPELINE

Ministerial meet fails to resolve deadlock

A group of ministers failed to resolve e controversial Kandla-Bhatinda troleum products pipeline issue even ter a 90-minute debate at New Delhi i February 13. Those who attended the eeting were the Railway Minister, Mr. eorge Fernandes, the Finance Minster, Ir. Madhu Dandavate, the Petroleum linister, Mr. M.S. Gurupadaswamy, nd the Deputy Chairman, Planning ommission, Mr. Ramakrishna Hegde.

It was finally decided that the Planing Commission should have a fresh ook at the project, estimated to cost s. 775 crores. Mr. Fernandes insisted at the railways should be associated vith the discussions at all levels. The roup of ministers met to settle the issue nce for all as the railways have been pset over the adverse impact the 1400 m pipeline project is likely to have on he former.

Mr. Fernandes embarassed top officials of the Petroleum and the Finance Ministries by demanding to know how he project could be posed to the World Bank without the Public Investment Board's clearance. He is believed to have stated that the clearance of the pipeline project would mean a drain of scarce resources out of the country, without in any way helping the poor. On the other hand, opting for the railway line would open the hinterland as well as vast opportunities for the people along the rail route.

The pipeline lobby insisted that the involvement of the Bank had made it imperative that the project be cleared without any delay. It was pointed out that the public sector undertaking — the Indian Oil Corporation — was paying the World Bank administrative charges having entered into a loan agreement last October. The loan is worth Rs. 300 crores. It was also pointed out that the company had internal resources to invest on a good project. The project was expected to be completed within three years and facilitate the movement of petroleum products.

The Petroleum Ministry's argument is that the rail line will take some six to seven years to complete, and would hinder the movement of petroleum products. It might be recalled that the former Planning Minister, Mr. Madhavsinh Solanki, had stated in no uncertain terms that the pipeline project should be scrapped as the country cannot afford to duplicate investment on two parallel projects estimated to cost Rs. 1,800 crores. The Planning Commission had cleared the Rs. 850 crore railway project as a portion was to be converted from metre gauge to broad gauge and a part of the line had to be constructed for defence purposes. Moreover, building a pipeline would be highly product-specific, it was pointed out.

The issue was reopened by the former Prime Minister, Mr. Rajiv Gandhi, who, overriding the recommendations of the Planning Minister, asked the then Finance Secretary Mr. Gopi Arora to discuss the project with the Railways and the Petroleum Ministry. The major objection of the railways is that if the pipeline is constructed, the railways will lose their main traffic of moving petroleum products. This would result in a revenue loss of Rs. 300 crores per annum.

Mr. Fernandes raised the same argument in the meeting. In fact, in a letter written to the Finance Minister earlier, Mr. Fernandes had suggested that surplus resources of the Petroleum Ministry could be utilised for the construction of the pipeline. In return, the railways could provide special tariff and movement facilities for the petroleum sector. The role of the Commission in the meeting was rather strange. A decision would have been arrived at but for the pro-pipeline lobby in the Commission. The Commission is divided on the issue. Some officials feel that the pipeline is a good project while others opine that it should be scrapped in the overall national interest.

CHECKING SPREAD OF HAZARDOUS WASTES

Signing of Basel Convention approved

The Union Cabinet has approved the signing of the Basel Convention by India on control of transboundary movements of hazardous wastes including household wastes of hazardous nature. A list of 47 categories of wastes from hazardous industries dealing with petrochemicals, biocides, dyes and dyestuffs, drugs and pharmaceuticals and other chemicals are covered by the convention.

Nuclear wastes are however not covered by the convention as it is dealt with by the International Atomic Energy Agency, an official release at New Delhi said. The convention seeks to prohibit the export of hazardous wastes without the consent of the importing country. The importing country would have to give its consent in writing before any export of hazardous wastes takes place.

The convention also provides that the consent of the transit countries who are parties to the convention should also be obtained by the exporting country before embarking upon an export. A time limit of 60 days has been given for transit countries to give their consent. After this time limit, the exporting country can start the export.

The convention does not include provisions on compensation for damage resulting from the movement of hazardous wastes. The United Nations Environment Programme (UNEP) is consulting governments to work out a protocol for liability and compensation for damage separately.

The draft convention was unanimously adopted by 116 countries including India on March 22 last year. It has already been signed by 38 countries so far.

ONGC, OIL CHIEFS TO BE SELECTED SOON

The Public Enterprises Selection Board (PESB) will soon hold interviews for the post of chairman of the Oil and Natural Gas Commission (ONGC).

This follows the request from the Petroleum and Chemicals Ministry to the PESB to initiate the selection process for the chairmanship of ONGC. According to official sources, the selection of a chairman for the ONGC will be through a regular process and the PESB is expected to hold the interviews for the post towards the end of this month.

The post of chairman, ONGC has been lying vacant since Col. S.P. Wah who was on an extended tenure, wa asked to hand over charge to the ONGC vice-chairman, Mr. P.K. Chandra, soo after the National Front Governmen came to power at the Centre. Then on there has been a lot of speculation abou the person to head the giant publi sector company and a lot of uncertainty within the ONGC.

The PESB has also initiated the pro cess for the selection of chairman, Oi India Limited (OIL). The term of th present chairman of Oil India is t expire in about two months.

PROFESSOR G.M. NABAR ENDOWMENT LECTURESHIP

Professor E.H. Daruwalla, Research Adviser, BTRA, will deliver a lecture under "Professor G.M. Nabar Endowment Lectureship" in the Old Auditorium of the University Department of Chemical Technology, Matunga, Bombay 400 019 on Monday, the 26th February 1990 at 6.00 P.M. The topic of the lecture is: "Contributions to disperse dye-polyester fibre and bi-functional reactive dye-cellulose interactions".

Professor M.M. Sharma, Director, University Dept. of Chemical Technology will preside over the lecture. The lecture is open to the public.

NTPC wins British safety council award

The British High Commissioner in India, Sir David Goodall, presented a "Sword of Honour" from the British Safety Council to Mr. P.S. Bami, Chairman and Managing Director, National Thermal Power Corporation (NTPC), at a ceremony in New Delhi recently.

The award is in recognition of the high safety awareness and attitude to safety management shown by both management and staff at NTPC's Ramagundam Super Thermal Power Station, which has been reflected in the efficiency of Ramagundam's safety system and in its consistently low accident statistics.

NTPC has achieved remarkable safety consciousness in an industry where, until recently, safety standards were at a relatively low level. In the past few years, Britain — through British Electricity International, the overseas consultancy arm of the British Central Electricity Generating Board — has been advising NTPC on site construction safety measures in order to make India's power stations safer places both to build and to work in.

Speaking on the occasion, Sir David said: "The competition in which Ramagundam has shown such excellent results is a very wide one, mounted by the British Safety Council throughout the world, to give recognition to those countries in which industrial safety is held to be an important part of everyday life.

"The National Thermal Power Corporation (NTPC) makes very considerable efforts to indoctrinate its staff, and their families, on safety at work and in their homes. NTPC has achieved a remarkable safety consciousness in an industry where, until recently, safety standards were at a sadly low level.

"The need for industrial safety is not as well recognised in many other parts of industry in India, and I hope that this ceremony of presenting an international award to NTPC can be well publicised to show that such efforts are not only well worthwhile in themselves, but also receive international recognition.

"In Britain, industrial safety has for many years occupied an important and prominent role in all our industries.

"Throughout the construction industry in India, much human effort is involved largely on the part of an untutored migrant labour force. There is a clear need to carry safety education, already practised in the larger corporate structures in India, down to this level. This can perhaps best be achieved by firstly writing more stringent safety clauses into every contract, and then by policing each to make sure that the contractor and his staff and labour are observing them. All too often we read of collapsed trenches, or several people being gassed on entering confined spaces without first having it tested for toxins, or walls collapsing where trenches are dug too close to the footings. Every engineer and every administrator in the engineering industry, of which power is a very large segment, needs to be on guard for such situations and to take every reasonable preventive measure he can. Guard rails on construction sites, protective head gear, protective footwear, interlocking keys for safety and high tension work, and sensible use of radio communication to warn staff of changing or potentially hazardous situations will ensure safety, and help to preserve life and prevent injury. Any of us who ignore the basic requirements and fails to do something to achieve them is as guilty of safety breaches as the contractor who is doing the work."

Sir David congratulated, in particular, Mr. N.K. Jain, who was the General manager at Ramagundam when this award was first earned and said "I have every confidence that his successor, Mr. S. Rajagopal, is keeping up the high standards.

"Equally, congratulations must go t NTPC for having fostered safety doc trines in all of their stations. I know th the organisation will continue t demand, and obtain, good safety prac tices in all of its corporations includin those of all its sub-contractors. I hop that Ramagundam's example will giv impetus and encouragement to the re of India's power and other industries t follow suit and strive after the highe safety standards."

HALDIA PETROCHEM: WBIDC SEEKS FRESH LI

The West Bengal Industrial Deve opment Corporation (WBIDC) ha applied for fresh letter of intent fo Haldia Petrochemicals following pro jected increase in production and chang of partner in the joint sector venture

Talking to newsmen at Calcutta o February 12, the State Finance Minis ter, Dr. Asim Dasgupta, said he ha already conveyed to the Union Petrol eum and Chemicals Minister, Mr. M.S Gurupadaswamy, that the applicatio would reach his Ministry in a day o two. Dr. Dasgupta said the original par ner of the project, R.P. Goenka, had sen a letter to the State govt. on Feb. 10 agreeing to transfer his share t WBIDC. A new memorandum o understanding would now be signe within a few days among the State Gov ernment, WBIDC and the new partne Tata Tea Ltd., he said.

MEET ON MATERIALS RESEARCH

The first annual general meeting o the Materials Research Society of Indi (MRSI) was held at the National Chem ical Laboratory, Pune on Feb. 9. Mor than 200 delegates participated in th two-day meeting being jointly hoste by the University of Poona and th National Laboratory.

IPCL's Nagothane ethylene plant to be commissioned in March

The Indian Petrochemicals Corporation Ltd. (IPCL) will commission the ethylene plant at its Maharashtra Gas Cracker Complex (MGCC) in Nagothane by the second week of March, using liquefied petroleum gas.

The decision to use LPG is an interim arrangement, which will be in force till the Oil and Natural Gas Commission (ONGC) starts supplies of ethane and propane from its extraction plant being set up at Uran, according to Mr. Hasmukh Shah, chairman of IPCL.

Mr. Shah said that his company has finalised arrangements for the supply of LPG with the oil co-ordination committee, and will start receiving the gas around February 25. The gas is likely to be supplied through the Indian Oil Corporation. With this, the IPCL will ensure that its ethylene plant does not lie idle for want of ethane and propane supplies from ONGC.

IPCL's ethylene plant is equipped to manufacture 80,000 tonnes of LDPE, 50,000 tonnes of ethylene glycol and 10,000 tonnes of ethylene oxide, annually. Mr. Shah said that the company has budgetted for a capacity utilisation of about 60 per cent for the first year of operation, with the stabilisation of plant facilities likely to take anywhere upto three months from the date of start-up.

Meanwhile, the company has recommissioned its propylene plant at the MGCC a few days ago. The plant, which is equipped to produce 60,000 tonnes of polypropylene annually, has started getting its propylene feedstock from Indian Petrochemicals Corporation Limited's Baroda facilities. This is also an interim arrangement, till March-end this year, when the company's own pipeline will be ready to receive propylene from the Bharat Petroleum Corporation Ltd.'s Mahul refinery in Bombay.

The propylene plant had been commissioned five months ahead of schedule in April last year, but could not begin fullfledged operations as it had not budgetted for propylene supplies at that time.

By September this year, when the ethylene and propylene plants are likely to be stabilised, the company expects to commission its HDPE and LLDPE plant as well. The plant will be equipped to produce 1.35 lakh tonnes of the two commodities annually. Originally scheduled for February this year, the plant's commissioning was subsequently postponed to June.

The ethylene plant, the commissioning of which was earlier scheduled for December last year, has been delayed mainly on account of heavy rains at the site last monsoon.

SULPHUR, ROCK PHOSPHATE PRICES REVISED

The selling prices of imported sulphur and rock phosphate for January-March quarter have been increased, barring delivery on high seas in the case of sulphur. According to a press release issued by the canalising agency, the Minerals and Metals Trading Corporation (MMTC), the revised prices are effective from January 1, 1990. The new prices for the current quarter (with the previous quarter's prices in brackets) per tonne are: Sulphur: the high-seas price for fertiliser use is Rs. 2,152 (2,154), ex-jetty Rs. 2,470 (2,397) and ex-plot Rs. 2,560 (2,479): for non-fertiliser use the selling price of sulphur is: Rs. 2,402 (2,404), ex-jetty Rs. 2,770 (2,647) and ex-plot Rs. 2,810 (2,729). Rock phosphate (SSP grade): the high-seas price is Rs. 1,270 (1,246) and ex-jetty Rs. 1,507 (1,482) for Calcutta only.

L & T plan to diversify into plastics

Larsen and Toubro (L & T) has proposed a Rs. 150 crores diversification into plastics which will make it a captive user of Reliance Petrochemicals' products.

L & T's foray into plastics will be two-pronged. The company plans to manufacture new generation plastics processing machinery, inspired by the Ambani urge for integration. It will also branch out into a host of moulded and extruded products for industrial applications.

An outlay of Rs. 135 crores has been projected for producing 26,000 tonnes of plastic moulded goods alone. The capacity for PVC-lined crown corks at Malanpur (Madhya Pradesh) is being enhanced by another 1300 million pieces at a cost Rs. 9 crores. The outlay and product profile for extruded product is being worked out.

L & T is already distributing rubber and plastic processing machinery made by Bucher-Guyer of Switzerland. Mc Neil Akron and Tire Equipment, both of the US and Sio of Denmark. Apart from these firms, L & T is talking to Krupp Formplast of West Germany and Fast Inject, a division of Netstal of Europe for producing their brands of machines in India. The last mentioned company specialises in fast machines for industrial plastics which are currently not made in India.

L & T Mc Neil Ltd., a company subsidiary based in Madras, received Government permission to manufacture plastic processing machinery in September 1987. The company has been talking to prospective collaborators and are on the verge of concluding a collaboration agreement, Mr. U.V. Rao, L & T Managing Director and Chief Executive Officer, said in a communication to company managers.

According to Mr. Rao, L & T Mc Neil will immediately take up manufacture of injection moulding machines. Manufacture of extrusion and blow moulding machines will be taken up later. A turnover of Rs. 150 to Rs. 200 crores has been projected for the plastic machinery business of the company in five years. He has estimated a Rs. 250 crores turnover for finished plastic products within five years. These will include rigid pipes, profiles for doors and windows, films and a host of other products.

L & T has set up a separate group with effect from February 1, which will be in charge of plastic machinery and plastic products. In future, this activity is expected to be split into two groups, one for machinery and one for plastic products. Rubber machinery being manufactured by L & T Mc Neil will also be handled by this group. Mr. Kalyan Chakravarti has been appointed General Manager in charge of this group.

L & T has taken off its earlier philosophy which confined it to manufacture of machinery alone. The only time it went into downstream products was when it branched off from cement machinery to cement manufacture. The downstream projects it now plans to enter call for a different kind of expertise and aggressive marketing. The risks are equally matched by opportunities. L & T's top brass till now content with 10 to 15 per cent growth, are now being goaded to achieve more than 30 per cent growth.

GUJARAT AMBUJA PLANS TO DIVERSIFY

Gujarat Ambuja Proteins Ltd., an upcoming industrial group, is planning to diversify into steel and petrochemicals sector. The company is toying with the idea of investing Rs. 30 crores in a steel complex and Rs. 80 crores on petrochemicals. This was disclosed at Madras by Mr. Vijaykumar Gupta, the Chairman and Managing Director of the company.

The company is entering the capital market at the end of this month with a fully convertible issue for a total of Rs. 11 crores. This is to part finance its ongoing programme of doubling its refining capacity and setting up a captive seed crushing plant and a solvent extraction unit. The expansion projects estimated to cost Rs. 14.21 crores are expected to be completed by March 1990. With this backward integration and expansion, the company will be one of the largest edible oil complexes in the country.

The turnover is also expected to cross Rs. 100 crores in its year ending September 1991. Last year it paid 20 per cent dividend and this year it expects to pay more. The issue opens on February 28. Referring to the petrochemical project, Mr. Gupta said it will be a joint venture with the Gujarat Industrial and Investment Corporation (GIIC), the State's principal promotional agency. It will be ready in about two years.

Mr. Gupta listed three supporting factors for the thriving industrial culture in Gujarat. One is the availability of power that enables each and every unit to operate at 100 per cent capacity. The second is the bureaucracy, efficient and also sympathetic outlook to the cause of business and industry. The third, he said is prohibition. For that reason, he claimed, Gujarat is the only place where the workers spend most of their earnings on their family.

GAS FIND NEAR MACHILIPATNAM

The Oil and Natural Gas Commission (ONGC) has discovered 15,000 cubic metres of gas at Kaikalore well, 40 km from Machilipatnam on February 1. An ONGC official said that drilling work is on at Lingala, Vadali and Kaikalore areas. The Union Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy, and the Chairman of ONGC would visit the areas shortly, he added.

Alcohol shortfall 779 lakh litres

An all-India survey by the Central olasses Board has projected a shortl of 779 lakh litres of industrial alcol during the 1989-90 season.

The Indian Chemical Manufacturers ssociation (ICMA) had earlier forecast deficit of 67 lakh litres during the year, ut this was based on data from five ates, which accounted for the bulk of cohol production and consumption. he CMB estimate, on the other hand, an update analysis of carry-forward ock, estimated production and conumption for potable, industrial and ther uses in all the States and Union erritories. It places all-India production 9,749.89 lakh litres and all-India conumption at 10,529.18 lakh litres, leavng a deficit of 779.29 lakh litres.

Only a few States will have surpluses. Important among them are Maharashtra 238.98 lakh litres, Madhya radesh 233 lakh litres, Tamil Nadu 207 akh litres and Uttar Pradesh 694.79 akh litres. However, their surpluses are ot big enough to bridge the all-India eficit. This year's scenario is in sharp ontrast with that of last year.

The total availability of alcohol luring the alcohol year 1988-89 was ,422.32 lakh litres and total consumpion 8,938.61 lakh litres, resulting in a surplus of 483.71 lakh litres. This surplus is after taking into account materal exported out of the country by two States: 207.92 lakh litres from Maharashtra and 407.41 lakh litres from Uttar Pradesh.

The CMB projections lend further weight to ICMA's plea for a ban on export of this feedstock overseas. The distilleries are keen on export because of better realisation. In the process, the country is losing foreign exchange because of import of value-added chemicals. On a rough estimate, there is a 25 per cent value addition in such imported chemicals. Major imports during the last few years include approximately 10,000 tonnes of acetic acid by Reliance Industries and 3,000 tonnes of butanol by Indian Petrochemicals Corporation Ltd. The value addition in producing these chemicals within the country is in the region of 40 per cent.

Some in the country fear that if exports are not banned, the country may even have to import the material to feed the increased demand occasioned by several new projects in the pipeline. These include SM Dyechem's glycol project in Pune whose annual requirement is around 10 crore litres. This project will help conserve the foreign exchange now spent on MEG imports and open the door for a host of ethylene oxide-based products which have tremendous export potential.

Shyam Bhartia's Vam Organic is planning massive expansion and diversification. Some existing polymer producers plan to step up their capacities or shift to alcohol route if availability is assured. DCW Ltd., for example, plans to expand its PVC capacity by shifting to alcohol route, and its application for alcohol allocation is pending with the Tamil Nadu Government.

The bleak alcohol scenario contrasts with the sugar cane. The way sugar production is increasing, India could have joined the league of exporters but for the fact that the per capita sugar consumption is increasing at an alarming rate. This is explained by two factors: increased consumption of sweets per se as well as substitution of conventional sweetening agents like gur by sugar.

Maharashtra has licensed seventeen more sugar units in the State. Gujarat is to have nine new sugar mills. Existing mills are also expanding and modernising. New technologies, however, will lead to reduced production of fermentable molasses. The CMB estimate for molasses for the alcohol year 1989-90 has projected the all-India availability at 50.28 lakh tonnes. Total utilisation (for distillation, cattle feed and other uses) is placed at 51.91 lakh tonnes, leaving a deficit of 1.6 lakh tonnes.

– **Shyam Kumar in Financial Express**

PESTICIDE DEVELOPMENT CENTRE ANNOUNCES REGIONAL WORKSHOP ON PESTICIDE FORMULATION TECHNOLOGY

Date: April 9-21, 1990. Venue: Pesticide Development Centre, Udyog Vihar, Gurgaon-122 016. Haryana. Fee: Rs. 3,500 per nomination (Rs. 3,150 for Associate Members) inclusive of registration, course material, lunch and morning & evening tea/coffee, to and fro transportation from Dhaula-Kuan New Delhi to PDC, Gurgaon, one site seeing tour.

Course content

* Pesticide formulations — Development, manufacture and quality control
* Recent advances in formulation technology
* Selection and quality assurance of raw-materials
* Packaging and handling
* Formulations and biological efficacy
* Application equipments and techniques

No. of seats: 10-12 participants from Asia-Pacific region + 10 Indian participants. Registration fee to be sent by DD in favour of 'Pesticide Development Centre' payable at Gurgaon. Last date for registration is 20th March, 1990.

GDR CHEMICAL FACTORY BLAST

An explosion ripped through part of a giant East German chemical plant on February 8, killing at least three people and injuring 19.

The blast was in a carbide-producing oven at the state-run Buna Chemical Combine near Halle, in a scarred old industrial belt about 250 km (150 miles) south of Berlin.

Rs. 500-crore package for leather sector urged

The Indian Leather Products Association (ILPA) has suggested that the Planning Commission should provide Rs. 500 crores during the Eighth Plan for setting up a modernisation and rehabilitation package for the leather sector. The ILPA Vice-President, Mr. G.K. Gulati, said that the package would comprise an exclusive modernisation fund for the leather sector, to be administered by any one of the financial institutions, as had been done for the textile and jute sectors.

Mr. Gulati urged the government to implement the recommendation of the Leather Development Council for providing an additional Rs. 60 crores for environmental pollution control and effluent treatment. To tackle the acute shortage of hides and skins, he suggested that the export promotion councils could act as bulk importers with institutional finance or the trade association could resort to imports through a consortium.

He was addressing a seminar on 'Finance for the leather sector: need for modernisation', organised by ILPA in Calcutta recently. Recent estimates revealed that the total requirement of finished leather in 1991 would be 1445 million sq. ft. and 1804 million sq. ft. in 1994-95, of which more than 50 per cent would be for export.

At present, the country's entire captive supply of hides and skins was being utilised to realise exports of Rs. 1,800 crores. By ILPA's reckoning, the industry would be hard put to achieve the Eighth Plan target of Rs. 3,600 crores because of raw material crunch. The deficit in supply of hides and skins has been estimated to be to the tune of 100 million sq. ft. in the beginning of the Plan period and escalate to about 200 million sq. ft. by its terminal year.

It was suggested at the seminar, that the industry should actively explore the possibility of sourcing hides and skins from the African countries and Brazil on a long-term basis. According to the association, pre- and post-shipment credit to individual exporters on easy terms was crucial for increasing competitiveness of Indian leather goods. It has urged the Government to enhance post-shipment credit limits to 270 days from 180 days at present to enable the exporters to offer attractive payment terms.

Moreover, the processing of the credit authorisation scheme (CAS) applications should be simplified and RBI should give weightage to the requirements of the individual exporter, especially of the leather sector since seasonal buying of raw materials created shortages of funds during peak buying time.

The association held that the margin money requirement for financing capital assets should also be reassessed and reduced by at least ten per cent apart from reducing the lending rate to six per cent from 13.5 per cent at present.

The seminar also deliberated on other issues like information relating to foreign exchange fluctuations, investments on effluent treatment plants, assistance to small exporters, and problems concerning irregularities in letters of credits.

LEATHER CHEMICALS, MACHINERY: STANDARDS SOUGHT

The Council for Leather Exports (CLE) pleaded for prescribing standards for leather chemicals, machineries and motors.

Mr. M.M. Hashim, chairman, CLE, who was addressing a national workshop on "standardisation and technology advancements in leather industry" organised by the Bureau of Indian Standards (BIS), CLE and Indian Finished Leather Manufacturers Association, in Madras said that in the absence of standard chemicals, exporters would face problems on the export front, which in the next decade will be a major ou for the Indian manufacturers of finis goods. It was also important what k of leather we should have for export the domestic market. In both the ca quality chemicals and machineries/ tors were necessary.

Mr. A. Sahasranamam, execu director, CLE called for consistent lity backed by trained and motiva manpower to effectively compete in global market. Right type of quality materials was also important, he add The leather industry in the Seventh P period had done remarkably well c pared with the Sixth Plan and this t would continue during the Eighth P also. The industry should therefore pare itself for the impending stiff c petition abroad.

Mr. Sahasranamam, said that the fied Europe in 1992 would pose challenges and opportunities for In exporters. There was also the need harmonisation of standards with Eu so that the country could take adv tage of the unified Europe. Mr Biswas, deputy director general DGTD focussed on the several ad tages India had in doing busi abroad, where high labour costs and orous pollution control measures c pelled market leaders to look to I for their needs. He wanted the l technology to be adopted and stre the need for strict in-process qu control measures.

Mr. S. Subramanyan, additiona rector general of BIS said in the of leather, the implementation of s dards has not kept pace except in s standards, with the progress in the c fields. Mr. M. Rafeeque Ahmed, c man of the association said as it "very difficult to formulate nation international standards owing to ch ing fashion and taste of the peop would be advisable to have com standards by the manufacturers t selves as in other advanced coun However, consumers interests shou kept in mind while formulating standards.

Drug & price control policy under review

The Centre's current drug and price control policy is under review and suggestions have been invited from the manufacturers, distributors and the public, according to Union Minister for Chemicals & Petrochemicals Mr. M.S. Gurupadaswami.

He told reporters at Hubli that his ministry also had a standing committee under the chairmanship of its secretary to monitor production and distribution of drugs and study complaints from all sections of people.

He said he would not be cowed down by threats from any quarter but keep the interests of all in mind, especially the consumers.

The main thrust of his ministry would be to ensure that medicines, particularly life saving drugs, were in adequate supply and at reasonable prices, he said. He promised that the government would fix reasonable prices for drugs, especially life saving drugs.

SYMPOSIUM ON DRUGS

An international symposium on 'Natural and synthetic drugs' opened on February 9 with a call for undertaking special projects for rapid implementation of new technology in the developing countries. Prof. A.K. Bose of the Stevens Institute of Technology of the US in his keynote address at the two-day symposium said "despite all political upheavals, the growth of science should not be retarded".

He urged the scientists to lay special emphasis on priority and frontier areas of drug research and said more freedom should be given to them to work on "target bound research projects".

The symposium organised by the Central Drug Research Institute (CDRI), Lucknow is being attended by some 150 scientists to discuss the current international trends in the drug development. Experts from the US, the USSR, France and Switzerland are among the participants.

The CDRI Director, Dr. O.N. Dhavan, in his welcome address said the institute in recent years had released as many as six different drugs for marketing.

There are also some one dozen different compounds presently under various stages of clinical trials and are expected to reach the market soon. Some of these compounds are anti-inflammatory, contraceptive and anti-filarial drugs, Dr. Dhavan said.

BENGAL DRUGS MAKING SSI FACE CRISIS

Drug manufacturing units in We Bengal's small-scale industries sect are facing a severe financial crisis d to the state government's failure clearing their dues amounting to aroun Rs. 7 crores.

Sources said that drug units we facing financial problems because of th failure of Central Medical Stor (CMS) to clear outstanding dues th had accumulated over the years. Th CMS functions under the state heal directorate and purchases medicines f all government health care programme

A spokesman of West Beng Small-Scale Drug Manufacturing ar Traders Association pointed out th Central Medical Stores had failed clear outstanding dues because i annual medicine purchase budget ha remained stagnant at Rs. 14 crores f the last ten years. This, despite the fa that cost of medicines had considerabl increased during the past decade whe a number of government health ca programmes were also launched. I view of this, the association has in letter to W. Bengal Chief Minister, M Jyoti Basu, on February 6 urged that sum of Rs. 5 crores be immediatel released to the Central Medical Store

DCW gets LI for PVC capacity hike

DCW Ltd. has received a letter of intent for doubling its PVC capacity from 25,000 to 50,000 tonnes per year. It is the only unit in the country producing the polymer from imported VCM.

The company is examining whether to go in for the VCM or alcohol route for expansion. It has sought alcohol allocation from the Tamil Nadu Government. If it gets the allocation, the company can produce PVC from the basic stage by converting alcohol into ethylene, as is done by another PVC manufacturer in the South.

Demand for the versatile polymer continues to grow with several new units coming up to manufacture PVC bottles, films and red mud plastic (RMP) roofing, a substitute for the cancer-causing asbestos. Another product which is struggling to replace wood is PVC doors. This product is yet to make a headway in the market.

Indigenous PVC prices remain unchanged despite recent changes in the import duty. The only producer to take immediate advantage of the increased customs duty has been the public sector Indian Petrochemicals Corporation Ltd. (IPCL) which froze sales following the announcement and then raised the quotation for two of its monopoly products — LDPE and PP.

As there are several producers of PVC, IPCL has refrained from raising the price of this polymer. Though no PVC producer has revised prices, the extent of discounts have come down. Prices are ruling around Rs. 26,000 a tonne.

Two new projects are being talked about — Reliance Petrochemicals and Finolex — both of whom are planning one lakh tonnes each. According to all accounts, both projects are making little headway. Both again are based on imported ethylene. Until such time PVC imports continue and indigenous ethylene availability is not stabilised, conversion of imported VCM into PVC makes a lot of sense, as the country saves foreign exchange in the process.

As the largest consumed polymer, PVC continues to attract discriminative excise duty. While other polymers attract 30 per cent excise duty, PVC attracts 42 per cent duty — 40 per cent excise and a five per cent surcharge on 40 per cent, called "drought surcharge".

Imported PVC attracts a countervailing duty of only 40 per cent. This difference amounts to approximately Rs. 350 to Rs. 400 per tonne in favour of the imported material.

PVC producers contend that imports are done mainly by large consumers and traders and imports meet only about half the total demand of the country. Hence the benefit of import duty reduction does not percolate to the other half constituting the vast majority of small-scale processors who depend on indigenous resin.

They have urged the Government to reduce excise duty as the benefit of reduced prices will percolate to all consumers including the users of imported resin as correspondingly the CVD on imported material will also come down. A reduction in excise duty to 30 per cent will bring PVC on par with other plastics.

The revenue loss on account of such a reduction in excise duty will be more than made up by the additional revenue on increase in import duty, producers have said. As this suggestion is revenue neutral, the Government will still benefit by saving in foreign exchange and the benefits of lower prices will be available to all processors and not just to handful of importers, they have argued.

GOVERNMENT TOLD TO FRAME POLICY ON PLASTICS

Mr. Nirmal Thakkar, president of Plastindia foundation, has said that the government should mould its policy on plastics keeping in view its importance in India's growing economy.

As plastics provide for vital social needs, help to conserve scarce resources such as energy, water, wood, metal etc. and serve the core sector, India should invest its resources in developing the plastics industry, Mr. Thakkar said.

In an article designed to remove the myths and misconceptions about plastics in the minds of policy makers, Mr. Thakkar has pointed out that the fortunes of the plastics raw materials manufacturers and processors are closely interlinked, and hence it is crucial to ensure a healthy growth of the plastic processing sector. "This can be achieved only when basic polymers are made available to the processing sector at an economically affordable price to make mega investments viable", he said.

UCL PLASTICS

UCL Plastics has suffered a loss of Rs. 6.60 lakhs during the 15-month period ended June 3, 1989, against a profit of Rs. 1.31 lakhs in the previous year on a higher turnover of Rs. 108.26 lakhs against Rs. 85.10 lakhs.

At the net level, there is, however, heavy loss of Rs. 59.03 lakhs during the period against only Rs. 4.96 lakhs in the previous year. The net loss has been calculated after interest charges (Rs. 26.35 lakhs against Rs. 2.99 lakhs), depreciation (Rs. 9.95 lakhs against Rs. 1.99 lakhs), preliminary and share issue expenditures (Rs. 1.63 lakhs against Rs. 1.30 lakhs) and investment allowance reserve (Rs. 14.50 lakhs against nil).

$12m WB loan for plastic institute

The Central Institute of Plastics Engineering and Tools (CIPET) is to get $12 million World Bank assistance from July this year for modernising its tool room facility. Of this amount $5 to 6 million would be available to the Institute in Madras, according Dr. K. Ramamurthy, director of CIPET.

Speaking at a seminar on hi-tech plastic projects at Madras on February 7, Dr. Ramamurthy said upgradation of tool-room facilities would help the Institute to quickly develop moulds for the plastic industry and reduce their imports from Taiwan and Japan.

Envisaging good scope for promoting a number of hi-tech projects in Tamil Nadu, Dr. Ramamurthy said that of the total of 12,000 processing small units in the country producing plastic materials worth 0.5 million tonnes, about 900 were located in the State.

He stressed the need for strong force of technical manpower in the field of plastic materials, as the requirement was expected to be around 1.7 lakhs by 1995, as against the estimated 90,000 in 1990.

Dr. K.U. Mada, executive director of IDBI mentioned that the flow of assistance from the bank to the plastic sector was not much all these years, mainly due to the problems in the availability of funds. However, he said that it would go up substantially in the coming years with the setting up of a number of petrochemical complexes.

He expected the demand for plastic products to go up steeply as they had distinct cost advantages over aluminium and other metals, besides finding wider applications in various fields such as electronics and electrical industries, agriculture, transport and other sectors.

Dr. Mada underscored the importance of building up the stock of skilled manpower to absorb the frontier technologies. Asking the entrepreneurs to benefit from Industrial Development Bank of India's venture capital fund, he called upon them to pay special attention to preparing good project reports.

He wanted the official agencies and small industries associations to establish common testing centres and take steps for disseminating the information among the entrepreneurs.

Mr. M.G.B. Balasubramanian, director of Chemicals and Plastics Ltd. and Mr. S. Sundararajan, director of Small Industries Service Institute (SISI) urged the Tamil Nadu government to give a fillip to the growth of plastic industry by extending all necessary support.

PEARL POLYMERS TO SET UP MORE UNITS

Pearl Polymers Limited to meet demand for its "PET" containers has embarked upon an expansion to increase its capacity at a cost of Rs. 10.8 crores. It proposes to set up plants in Maharashtra as well as in Karnataka to cater its products on an all-India basis.

The cost of expansion at Mahad, Maharashtra, is estimated at Rs. 1,080 lakhs. With a view to raise funds for the expansion programme and to meet part of the working capital requirements, the company is offering 14 per cent redeemable partly convertible debentures of Rs. 70 each for cash at par.

With the competition of the third unit near Bangalore in Karnataka the company hopes to do a turnover of Rs. 35 crores by 1991-92. The turnover by March 1990 was expected to be Rs. 15 crores. For the nine-month period ended December 31, 1989, the company's turnover was Rs. 10 crores and profit after tax was Rs. 68 lakhs.

Crucial role of fertilizer industry

The offtake of various nutrients has been quite brisk with the prospect of a significant increase in the output of foodgrains, pulses and oil seeds in the rabi season. The yield of the crane crop also is expected to constitute a new record at 210 million tonnes in 1989-90. The output of cotton also will be touching an all time peak of 115-120 lakh bales in the current season.

The production of foodgrains, oilseeds and sugarcane particularly has to be increased steadily for meeting the growing demand and obviating the need for imports for bridging the deficits that may emerge in the absence of adequate supplies from indigenous sources writes Leo in the Hindu.

The capacity for manufacturing fertilizers has to be steadily expanded in the coming years. Though the output of urea and other nitrogenous nutrients has been rising, there may be a shortage if fresh capacity is not created without delay.

The dependence on imports of ammonia on outside sources by the manufacturers of diammonium phosphate and other complex fertilizers is also resulting in avoidable outgo in foreign exchange.

Need to step up ammonia output

Except for the successful attempt of Deepak Fertilizers to manufacture ammonia for effecting sales to outside customers, no major unit has been established for producing ammonia alone or the existing fertilizer plants have any significant excess ammonia production which can be absorbed by other dependent units.

Since there will be no need for importing feedstock for producing ammonia and adequate supplies of naphtha and natural gas are available, every encouragement should be provided for establishing new plants for producing ammonia and displacing imports.

The requirements of phosphoric acid can, of course, be met partly through imports as it will take some years for overcoming the shortages in this regard and also a difference of opinion about the advisability of manufacturing complex fertilizers based on imported rock phosphate and sulphur.

While it may be advantageous to import diammonium phosphate and other complex nutrients when prices are ruling lower relatively, it will not be desirable to depend entirely on imports of complex fertilisers.

The major decisions about the implementation of expansion and new schemes for stepping up the output of nitrogenous and complex fertilizers have, therefore, to be taken expeditiously. However, any significant increase in capacity of the fertilizer industry can take place only if the policy regarding the fixation of retention prices is suitably revised.

Retention prices should be realistic

It is now agreed that the new formula for retention prices which became effective from April 1, 1988 has affected seriously the profitability of different units and that the new entrants particularly experience great difficulty in recovering fully even heavy overheads not to speak of paying a reasonable dividend on equity capital. It is now accepted that depreciation allowances should be claimed in a shorter period and the operating ratio also should not be fixed at high levels for computation purposes.

The Union Finance Ministry is in a difficult predicament as any increase in retention prices will be resulting in an increase in the burden of subsidies. But the cost of production can be brought down only if the feedstock can be secured at reasonable prices and end prices fixed realistically though there is disinclination to raise the cost of nutrients to the farmers when it is being emphasised that agricultural sector should be encouraged to increase its income substantially.

The contradictions in approach can be resolved only if it is recognised that cost increases are unavoidable when imports of crude oil and other inputs may be requiring heavy expenditure in foreign exchange. Also, continuing devaluation of the rupee is resulting in dearer inputs in rupee terms.

Ticklish problem of subsidies

As natural gas resources are plentiful and no foreign exchange is involved in its manufacture except in the creation of process facilities, it has to be examined how differential prices can be charged for the use of gas for various purposes and the cost of fertilizers also lowered suitably with an improvement in the operating efficiency and efforts to maximise the yield of nutrients from the same doses of inputs. Otherwise, expenditure on subsidies will be rising with increasing consumption and the violent fluctuations in the average cost of imports.

INSECTICIDES: WRONG USE CAUSES POLLUTION

It is not due to the use of insecticides but due to ignorance in the proper methods of applications of insecticides that causes pollution, stressed Mr. Jatindra N. Shah, president of the Indian Pest Control Association (IPCA), recently. He was addressing the 23rd annual convention of IPCA which had adopted the theme of "we care for you."

He also visited Trivandrum before leaving for Madras. Sources said that Mr. Chandran has not been happy in FACT lately as he has a few detractors in Udyogamandal, who have been posing problems. It was when his term in FACT ended that Mr. Chandran was appointed chairman and managing director of HFC and asked to simultaneously handle both FACT and HFC. Sources close to Mr. Chandran informed that rumours about his leaving "are fifty per cent true". Mr. Chandran, according to the sources, has left the choice to the government.

He is learnt to have infonned the deputy prime minister that he is willing to continue if the government gives him the full support and have full faith in him. Otherways he is prepared to quit. This is because hard decisions are called for both in FACT and HFC. This has led to wild speculations, especially in FACT circles at Udyogamandal.

P-XYLENE IMPORT ARRANGED FOR BOMBAY DYEING

IPCL has floated a tender for import of 4,000 tonnes of paraxylene on February 6 to feed the DMT plant of Bombay Dyeing, according to Mr. Hasmukh Shah, Chairman IPCL. It was reported earlier that IPCL had not floated an import tender as of Feb. 5, when a meeting was taken by the company in the city to examine the demand-supply situation of paraxylene.

Mr. Shah said that imports of paraxylene could land within about 4 weeks' time. Clearly, the government has decided to defuse the paraxylene issue as otherwise Bombay Dyeing could have been strapped for raw materials.

The import decision also explodes the myth of a surplus in paraxylene which had made Reliance Industries Limited to float an export tender for 10,000 tonnes of paraxylene with March delivery.

The government has cleared foreign exchange for import as it is clear it cannot rely on the promise made by Reliance at the February 5 meeting. At that meeting, Reliance Industries Limited (RIL), offered 8,000 tonnes till March 1990 and for April to March 31, 1991, it guaranteed a total of 39,000 tonnes.

The company refused to disclose its actual capacity, production, stocks and prices at which it will offer paraxylene to Bombay Dyeing.

IPCL at the meeting offered 10,000 tonnes between July 1990 and March 1991. Currently the world quotations are put at US $ 410 per tonne and with an import duty of 80 per cent, the landed cost could come to around Rs. 14,00(per tonne far less than Rs. 22,500 pe tonne charged by IPCL earlier.

It could also mean a drop in DM quotations. Simultaneously, the BICP i making a fresh cost study of the para xylene expansion of IPCL as the com pany feels the earlier fair price o Rs. 9,852 per tonne after expansion t 45,600 tonnes per annum is on the lowe side. IPCL has submitted cost detail

The company has imported 37,54 tonnes of paraxylene between Marc and December 1989 and states "th normal period of arrival is four week from the date of placement of order an some times the period is even sharper."

For the time being, the governmen has not bitten the line thrown by Rel ance Industries but it has a job on han when it will have to co-relate fin prices of DMT and PTA, produced b RIL. Low cost paraxylene (imports should not be the yardstick for IPC when it supplies 10,000 tonnes betwee July 1990 and March 1911. In tanden Reliance should be made to sell at a fa price its claimed surplus and that ca only happen provided the governme has a look into the paraxylene capaci of RIL. Its capacity should be arou 2 lakh tonnes per annum if it can expo 10,000 tonnes and supply in the loc market another 39,000 tonnes.

TITANIUM DIOXIDE

Kerala clears Tata entry

The ruling Left Democratic Front in Kerala has cleared the proposed entry of Tatas into the titanium dioxide in the state with an investment of Rs. 340 crores.

This was disclosed by the convener of the state level co-ordination committee to the LDF, Mr. M.M. Lawrence, at a press conference.

Mr. Lawrence, however, clarified that the clearance was for a joint venture by the Tata-owned Tomco and the state-owned titanium dioxide units.

Asked about the failure by the state government to meet the deadline reportedly set by Tatas, Mr. Lawrence said that he was not competent to comment on it.

Tatas are said to have insisted originally that the state government should give them a reply in one month since the offer to invest Rs. 340 crores either in the private sector or in the joint sector had been made. However, a decision has been hanging fire.

Mr. Lawrence announced that the LDF would soon initiate a dialogue with trade unions, political parties including those in the opposition and industrialists with a view to further improving the industrial climate in the state. He, claimed that the investment climate was better than that in many other states. But there is scope for further improvement and hence the move to have a dialogue.

Mr. Lawrence expressed the view that the labour in the state had been more sinned against than sinning. Often there was an attempt by certain quarters to create an impression that militancy of labour was the sole reason for the state's industrial backwardness. Even those within the state including some government officials and media persons were trying to propogate that the state's investment climate was poor. Even if they did it with good intentions, their action would only have negative impact. The state has had much bad publicity.

Mr. Lawrence said that the LDF had decided to evaluate the performance of each government department including industry and labour.

ALUMINIUM, BAUXITE-BASED UNITS: BIRLAS OFFER TO INVEST IN KERALA

Close on the heels of the Tatas who offered to invest in the titanium dioxide industry in the state, the Birlas have also lately come forward to invest in Kerala for setting up aluminium and bauxite-based units.

Disclosing this in the state assembly during question hour, the Kerala minister for industry Mrs. K.R. Gouri confirmed the reported move by the Tata Oil Mills Company (Tomco) to invest Rs. 340 crores for the expansion of the state's titanium dioxide industry either by setting up a private unit or a joint sector unit. The offers by Tatas and Birlas are being considered by the state government, she informed.

The Birlas have approached the state government for investing around Rs. 600 crores for exploiting the state's bauxite resources in Cannanore and Kasargode districts. The government has authorised the Kerala State Industrial Development Corporation to conduct a survey and submit a detailed project report as to how best the bauxite deposits in the state could be exploited for industrial purposes. A decision will be taken on the Birla offer as soon as the survey is completed and the project report submitted by the KSIDC.

Another industry in which the Birlas have shown interest of late is aluminium. They have had preliminary discussions with the KSIDC in this regard. The proposal is to set up an integrated aluminium complex.

Besides the offers from the private sector, the public sector is also set for massive expansion, Mrs. Gouri stated. Already a consortium has been formed by the KSIDC and the Central public sector undertakings in the state like Fertilizers and Chemicals Travancore Ltd. (FACT), Hindustan Organic Chemicals (HOC), Cochin Refineries Ltd. (CRL), etc.

The consortium has been set up to speed up expansion, diversification and modernisation projects of existing units as well as promoting new units jointly by these undertakings and the KSIDC. Presently expansion projects totalling Rs. 2,080 crores are before the Central government pending approval.

The Cochin Refineries alone propose projects worth Rs. 4165 crores. Already the refinery is implementing a Rs. 650-crore expansion project. FACT's caprolactam project also envisages an expansion costing Rs. 1135 crores, she said. In Kerala, licenses had been sought for 21 large-scale industrial units, she said.

TITANIUM DIOXIDE UNDER OGL URGED

Titanium Dioxide, an essential raw material for rubber footwear industry has been in short supply for the last 20 years, according to the All India Federation of Rubber Footwear Manufacturers.

The scarcity, a federation release said had hit the rubber industry in a big way and had also led to rampant blackmarketing. To save the industry, the federation has urged the Government to allow import of titanium dioxide under OGL with reduction in duty from 10[illegible] to 25%. The Government should also check the price of the commodity in the open market to stop blackmarketing.

Chambal Fertilisers' site finalised

The Rs. 764-crore HBJ gas-based rtiliser complex — Chambal Fertili-rs and Chemicals Ltd. — will now see e light of the day after having wasted ver four years going through the ureaucratic ordeals on the question of nal location of the plant.

The new location of the complex at adepan, 35 km from Kota in Rajas-an, is now final. It is owing to the long ne taken in deciding the final location at the project cost has gone up by at ast Rs. 100 crores. According to esent indications the project is likely go on stream in two-and-half years.

It was in 1984-85 that the Centre sued a letter of intent to Zuari Agro ertilisers and Chemicals Ltd. of the irlas to put up one of the six HBJ as-based fertiliser projects at Sawai adhopur in Rajasthan. It was the entre which had selected Sawai Mad-opur as the "ideal location" for the omplex and the Birlas lost no time in oing ahead with the project.

But to their surprise a dispute arose n the location of the plant soon after. he dispute related to the likely damage e water effluents that would be dis-harged in the Banas river, may cause the tigers at the nearby Ranthambore anctuary. The river passes through the nctuary and it was feared that the nimals might be affected by the con-minated water.

The stand taken by the Birlas was that e fears of water contamination were aseless as nothing of the sort would be llowed to happen.

By then, the Birlas had also spent early Rs. 5 crores on land levelling and ying pipelines to bring water to the site om the Banas river. The Centre, how-ver set up a new committee, headed by Ir. T. Seshan former Cabinet Secre-ary, to go into the question.

The committee upheld the view of the likely damage the location at Sawai Madhopur may cause to the animals and suggested a new location.

For the new site, the environmental clearances have now been finally issued and the land has been allotted by the State Government. The total land required for the project is 1,033 acres. It also includes some forest area.

The installed capacity of the plant will be 2,250 tonnes of urea and 1,350 tonnes of ammonia per day and the water requirements will be met from the nearby Kali Sind river. However, the promoters have also considered a proposal to bring water from the Kota barrage to the extent of ten million gallons per day. Snam Progetti of Italy has entered into technical collaboration for the project and it is learnt that it may also provide some equity support.

Agreements have also been signed with Toyo Engineering and Haldor Topsoe of Japan. A sum of Rs. 200 crores will be needed in foreign exchange to complete the complex which has also been assured Rs. 287 crores as term loan by IDBI. While the equity of the project is put at Rs. 79.40 crores, the promoters will also raise an equal amount from the capital market.

The parent company — Zuari Agro Fertilisers and Chemicals Ltd. had made a gross profit of Rs. 27.19 crores in the 15-month period ending March 1989 as against Rs. 16.01 crores in the preceeding year. The net profit was to the tune of Rs. 12.06 crores compared to Rs. 4.34 crores in the previous year.

While work on the four HBJ gas-based projects has commenced, there are some difficulties in regard to the Shahjahanpur project which was originally given to Apeejay Fertilisers of Mr. Swraj Paul. The latter is now learnt to have withdrawn from the project.

For Rajasthan, the Gadepan fertiliser complex will be first of its kind and will help the State develop fast industrially.

Chambal Fertilisers seeks mutual funds to raise equity

Mr. K.K. Birla, promoter of Chambal Fertilisers and Chemicals Limited (CFCL) is seeking help of mutual funds to raise promoters' equity.

The company has approached Canbank Mutual Funds to put in around Rs. 10 crores and has approached another mutual fund for a similar amount as Mr. K.K. Birla is not being able to raise promoters' contribution of Rs. 86.40 crores. Based on a debt equity ratio of 4:1 the share capital is put at Rs. 152.80 crores comprising promoters' contribution of Rs. 86.40 crores and public issue of Rs. 66.40 crores. The mutual funds under 80 CC of the Income-Tax Act can provide upto 10 per cent of the total equity in a project.

It needs Rs. 19.40 crores from mutual funds as it has received applications for allotment of shares to the extent of Rs. 47 crores. Besides the company holds commitment to the extent of Rs. 20 crores.

CHANDRAN MAY QUIT AS CMD OF FACT, HFC

Mr. N.B. Chandran is likely to relinquish office as chairman and managing director of the two fertiliser giants in the country — The Hindustan Fertiliser Corporation (HFC) and the Fertilisers and Chemicals of Travancore Ltd. (FACT).

According to reliable information, Mr. Chandran himself has volunteered to quit. He is learnt to have informed the Deputy Prime Minister, Mr. Devi Lal, that he is willing to bid goodbye to the public sector fertiliser industry. Incidentally, Mr. Chandran is also the president of the Fertiliser Association of India (FAI). Mr. Chandran was at Udyogamandal, the headquarters of the FACT on a brief visit on Feb 8.

Need for fresh laws to curb sea pollution

Dr. M.S. Swaminathan, noted agronomist has called for learning lessons from ecological history and for a global consciousness to present environment from further damages as can be seen from ocean pollution, diminishing of forest wealth, especially tropical rain forests, and the degrading ozone layer.

"Inaugurating the Department of Environmental Sciences at the Tamil Nadu Agricultural University at Coimbatore recently, he said that the nineties will be an important decade in as much as the country has to develop a sound food security system and life security system so that we have to preserve and improve the flora and fauna as also the seas without damaging biological diversity and improving biological productivity.

He pointed out that inspite of global awareness to reduce damages to environment, legislations like the law of the seas do not provide stringent restriction to penalties for causing environmental pollution. He, therefore, suggested drastic changes in the law to prevent sea-pollution. He also suggested coastal management of the south India coast by leaving a ten mile eco zone on land and on sea.

He stressed the need for arresting destruction of plantations like mangroves which are of ecological importance. He also called for stopping destruction of sea weeds which aid environment preservation.

Expressing concern over the industrial pollution in the country due to rapid industrialisation and urbanisation, he warned that precautions should be taken to forestall the catastrophe of acid rain and ozone depletion which is threatening some of the developed countries.

He said that the per capita land wealth was meagre so that farm lands should be made more productive by arresting soil and water erosion besides stopping destruction of microorganisms and beneficial living beings like the earthworm.

Dr. S. Jayaraj, Vice-Chancellor, TNAU, gave an account of the several pollution control research projects undertaken by the university to contain pollution in industries like leather, food, viscose, fertiliser besides restricting and reducing damage to industrial wastes in industries like dairying.

BIOTECHNOLOGY GROWTH VITAL

Noted agronomist Mr. M.S. Swaminathan has called for development in the field of biotechnology as it would open new vistas of countless new job opportunities especially for the young.

Delivering the G.P. Chatterjee memorial lecture at the plenary session of the Indian Science Congress, at Cochin recently he said the famine of jobs for the youth could be successfully met with development in the biotechnological field. Without adequate opportunities for skilled employment, poverty will persist, urban slums will grow and social unrest will undermine political stability. It is in this context that recent developments in biotechnology assumes significance, he said.

Dr. Swaminathan said that the hardcore of biotechnology is molecular biology and genetic engineering. The emerging tools for the transfer of genes across sexual barriers provide unusual opportunities for promoting sustainable advances in the productivity of crop plants and fodder for animals. This is essential since both land and water are shrinking resources for agriculture.

The other major applications include the use of tissue culture techniques for propagating superior material of horticultural plants and forest trees, diagnosis and control of animal and plant diseases and desirable biological transformations induced micro-organisms. In addition, new opportunities exist for th preparation of value-added produc from every component and animal bi mass, he said.

A former Director-General of th Indian Council of Agricultural Researc (ICAR), Dr. Swaminathan said that bi technology is a human resource, pla and animal germ plasm-based industry India is rich in both these resources. will be foolish on our part not to deriv benefits from these twin blessing —vast population and the rich biolog ical wealth. What the country needs fo this industry are large number of youn men and women who have passed th 10 plus two examination.

In this context, he suggested th Ernakulam district in Kerala which ha the unique distinction of being the fir district in the country with cent per cen literacy be developed into a biotech nology district with initial emphas on tissue culture and biomass proces sing.

BPCL EXPORTS BENZENE WORTH $1M

The Bharat Petroleum Corporatio Ltd. (BPCL) became the first to expo benzene from the country, when i loaded about 3,000 tonnes in Bomba for a Swiss party in Korea, accordin to a press note.

The export, which was finalise through the State Trading Corporatio will bring in about $1 million in foreig exchange. The quality of BPCL's ben zene is claimed to be in the highest run of international standards.

Bharat Petroleum Corporation Lim ited has been able to achieve this expo by taking advantage of a surplus situ ation in benzene. While the demand fo benzene in the country is steadily grow ing, the current indigenous demand i being fully met, according to the co poration.

Special courts for pollution cases

Special "environment courts," first their kind, are to be set up shortly in e country and the Government is conlering introduction of "civil liability" environmental cases to ensure adeuate compensation to the pollution fected people. This was indicated by inister of State for Environment, Mrs. laneka Gandhi.

Mrs. Gandhi, who was inaugurating two-day conference of officers on Environmental Pollution Control" at ew Delhi on February 12, said that it d been decided to introduce a scheme r direct funding of State Pollution ontrol Boards by the Centre and place ore resources at the disposal of these ards to enable them to take prompt d effective pollution control meaures. In this context she referred to the 300 million assistance promised by the orld Bank to strengthen the pollution ontrol boards and to give loans to dustries to set up effluent treatment ants.

Expressing concern over environental degradation the Minister urged ose attending the meeting to join in is crusade against pollution. The conrence which was attended by the Envionment Secretaries, Chairman of the ollution Control Boards and Commisoners of Transports from States and e Union Territories discussed the poution caused by motor vehicles. It evoted quite some time to automobile ollution. The Government has mended the Central Motor Vehicle ules to check emission of smoke from ehicles. The States are to be armed ith the necessary powers for carrying ut checks on the level of smoke emision so that the rules could be implemented effectively from March 1.

Pollution from industries and mangement of hazardous waste were some f the other important items listed for iscussions. The need for detailing of n-site and off-site emergency plans to eal with the hazards posed by chemical industries and streamlining and strengthening the central crisis group's alert system were stressed.

The action taken against the polluting industries under the Environment Protection Act in various States does not seem to be very encouraging as according to available statistics, four States have taken action in 17 cases. This includes 10 cases in Andhra Pradesh, three in U.P. and two each in Bihar and Tamil Nadu. Mrs. Maneka Gandhi, said the World Bank money would be utilised to strengthen pollution control boards in Maharashtra, Gujarat and Tamil Nadu, where the incidence of pollution was very high.

The objective is to disseminate information on hazards of pollution and how best to control them and train officers well in pollution management, she said. The former Chief Justice of the Supreme Court, Mr. P.N. Bhagwati, had been asked to prepare a draft on the establishment of "environment courts" and it was expected in another week, she said. Mrs. Gandhi said the Ministry was also considering the idea of air tax: the industries paying penalties for the pollution caused by their effluents and gases. Industries emitting chloro-fluoro carbons that damage the ozone layer should be taxed heavily, she said.

The Minister urged officials in pollution control boards to exercise the utmost vigil in booking industries owhich were polluting air and water and creating public health problems. At present only notices were issued to offenders and they took a stay in court against the order, she said. Mrs. Gandhi said these industries thought "they had defeated the Environment Minister and Maneka Gandhi. They have not defeated Maneka Gandhi but their children's right to live. It is a moral issue."

She said her Ministry was being viewed as "anti-development" which was not true. Ever since she had taken over the Ministry, she said, she had tried to focus attention on public health problems and wanted the authorities concerned to take public safety into account while executing big projects. "We only want to take development on the path it should be taken," she said. Referring to the Ganga action plan in cleaning up the holy river of effluents, Mrs. Gandhi said, the project had made very little headway. Mrs. Gandhi expressed concern over the import of certain pesticides banned abroad. She cited DFC as a deadly chemical still being imported in the country.

DDT, she said, had been banned in most countries but still trucks were moving around in cities spraying this to eradicate mosquitoes. "DDT settles on our food, water and vegetables and harms us but the mosquitoes get fatter, and arrogant," she said.

GREENPEACE COMBAT PLAN FOR GLOBAL WARMING

The international environment organisation Greenpeace has worked out a plan to combat the global warming effect by reducing by 30 per cent harmful emissions from burning fossil fuels by the year 2000.

In its three-phase plan, issued in London recently, Greenpeace also called for an end to global deforestation by the beginning of the next decade and a complete ban on the use of chlorofluorocarbons (CFC's) by 1995. Current technology is advanced enough to make the use of these substances unnecessary, Greenpeace said. Within the next few years, lifestyles will change and technological development advance even more so that further progress will be made by the beginning of the next century, the report said. Over the first two decades, a further reduction by 40 per cent of carbon dioxide will be necessary. The remaining harmful emissions could be compensated by an extended reforestation programme, the report said.

British Gas keen on joint ventures

The British Gas Chairman and Chief ecutive, Mr. Robert Evans, has said at his company is keen on participa- ng in joint ventures with Indian firms, oth within the country and in projects verseas.

Mr. Evans, who is in India currently r discussions in this regard with top fficials in the oil, gas and energy sec- rs, said that the company was cur- ntly concentrating on city gas stribution projects in Bombay, Delhi nd Calcutta.

The other specific areas of interest iclude design, engineering, procure- ent, construction, operation and aintenance of pipelines and provision f pipeline inspection services. The ompany is also keen on develop ment f onshore and offshore fields, import f liquefied natural gas (LNG), joint rojects for manufacture of oil and gas quipment and participation in the ourth round of petroleum exploration cence (PEL) in India.

In this connection Mr. Evans has held iscussions with several officials and lso the Petroleum Minister, Mr. M.S. Gurupadaswamy. He said Mr. Gurupad- swamy had evinced keen interest in afe and reliable city gas distribution ystems, an area in which he said his ompany is uniquely placed in terms of xpertise and state-of-the-art technol- gy.

Mr. Evans, who had visited India in anuary 1989, said his current visit was ndertaken in view of the fact that "some of the principals" on the Indian cene had changed after the recent elec- ions.

British Gas, which was privatised in 1986, is in the process of building a global gas business and is encouraged by the opportunities available in India, he said.

According to him, gas is the fuel of the future and held bright prospects for India. If properly utilised, India's gas resources could be used to bring about a revolution in the comfort standards of people as has been achieved in Britain.

Currently, British Gas is working on introduction of natural gas to Delhi and its suburbs. Mr. Evans said most of the work in this regard has been completed but some economic considerations needed further study. Similar distribution systems for Bombay and Calcutta are also under discussion, he added.

Credit lines for such and other projects would be available once the packages are finalised. He said during his talks with Indian officials, no firm indication was available about when bidding would start for the fourth round of petroleum exploration licence.

British Gas would be happy to collaborate with Indian companies on projects planned by them or on those identified by British Gas itself in third countries.

The company is also hoping to undertake further work for Gas Authority of India Ltd. (GAIL) on a study associated with the Hazira-Bijaipur-Jagdishpur (HBJ) pipeline.

Mr. Evans said import of LNG is one of the options India should consider seriously, given the importance attached to power generation to cope with future demand.

According to him, there were huge quantities of gas available in West Asia, which could be liquefied and brought to India. Alternatively, India should draw up plans to effectively use the abundant local reserves of gas.

British gas was also keen on participating in joint ventures as an equity holder.

IPCL seeks World Bank aid for Gandhar project

Indian Petrochemical Corporation Ltd. (IPCL) is seeking a $ 300-million World Bank loan to finance its upcoming Gandhar petrochemical complex.

IPCL has always enjoyed the confidence of international funding bodies. However, if the World Bank loan does not come through, the project could face rough weather as the Government may not be prepared to fund its foreign exchange requirements.

The National Organic Chemical Industries (NOCIL)'s letter of intent for expansion, for example, clearly states that the company will finance its foreign exchange requirements for import of capital goods, knowhow, servicing of foreign equity, foreign loans and feedstock etc. on its own.

It is not clear whether the public sector and joint sector projects are governed by the same rules. The Industrial Development Bank of India (IDBI) has estimated that the Haldia project will incur a continuous foreign exchange outgo of approximately Rs. 200 crores a year on naphtha imports.

Unlike the naphtha-based projects, however, the Gandhar project will be based on the rich gas and oil resources discovered in the region. The reserves are estimated at 190 million tonnes of oil and oil equivalent of gas out of which about 73 million tonnes is recoverable. The total production of the associated and free gas is expected to reach six million standard cubic metres a day (mmscmd) and this can be easily enhanced to 10 mmscmd.

IPCL has now received pre-PIB clearance for the project at an estimated cost of Rs. 2,300 crores. Two suppliers of cracker technology-Lummus Crest and Stone and Webster — have submitted technical bids and bids from some other parties are expected soon. The project is to be completed within four years from the zero date.

The project is to come up at Jageshwar, 20 km south of Gandhar. Gas would be supplemented by 2.35 lakh tonnes of condensate to produce three lakh tonnes of ethylene, with a provision to step up the capacity to four lakh tonnes at a later stage.

The project will have an integrated offsites plant for all utilities like steam, cooling water, nitrogen, oxygen and instrument air. It will also have a captive gas-based power plant of 75 mw.

The throughput will comprise ethane/propane 4.5 lakh tonnes, ethylene three lakh tonnes, propylene 20000 tonnes, butadiene 10000 tonnes, EDC 2.4 lakh tonnes, VCM 1.50 lakh tonnes, PVC 1.5 lakh tonnes, EO/MEG 1.2 lakh tonnes, alpha olefins one lakh tonnes, alcohol ethoxylates one lakh tonnes, primary alcohol one lakh tonnes, chlorine 1.05 lakh tonnes and caustic soda 1.2 lakh tonnes.

MORE OIL STRUCK IN CAUVERY BASIN

The Oil and Natural Gas Commission ohas found more oil in the Nannilam and Narimanam structures in Thanjavur district in the Cauvery onland basin, further reinforcing the prospects of the Cauvery basin as an oil-rich area. The hydrocarbon strikes were made recently.

From the second well at Nannilam, drilled recently, oil was flowing at the rate of 67 tonnes a day i.e. about 500 barrels while another well at Narimanam structure was yielding about 74 tonnes of oil (555 barrels) a day. "The oil in both the places is sweet (devoid of hydrogen sulphide). It is very light. It is high quality oil," sources said.

"From the general standards in the area, this is considered to be hig promising. The implication is that th two wells have further improved prospects of the Thanjavur area of Cauvery basin," they said. The w would be put on early product system by the Oil and Natural G Commission. The early product system is an innovative measure bring a hydrocarbon strike into prod tion, without waiting for the delineat of the field and the development of complete infrastructural facilities. T leads to quick earning of revenue.

The two wells will be connected othe group gathering station of oi Narimanam. The last hydrocarbon st in the basin was made at Adiyakam galam in Thanjavur district on Aug 31, 1989. The well released 600 bar of oil a day and one lakh cubic me of gas a day.

The production of oil from the onl Cauvery Basin is more than 5,000 b rels a day now and it will increase more than 6,000 barrels when the la oil finds are brought under the e production system.

The ONGC is already mak arrangements to transport this crude by rail tankers from Nagapattinam Madras Refineries Limited, Manali, re-processing, which will result in c ting down of costs in transportation. rail transportation of crude may be in some weeks. Right now, crude f Thanjavur and Bhuvanagiri in So Arcot is being brought to Madras Re eries by road tankers.

SCIENTISTS TO STUDY OZONE DEPLETION

About 250 scientists from 40 co tries and international organisations to participate in the three-day inte tional conference on tropical ozone atmospheric changes at Penang, Ma sia from February 20. The Malay prime minister, Dr. Mahathir Moha has consented to open the confere

NGC's new projects to cost Rs. 15,000 crs.

The Oil and Natural Gas Commission NGC) is likely to incur an expenditure of about Rs. 15,000 crores during the next five years on various projects d new schemes, including the namic plan of production (DPP) in ombay offshore.

Foreign exchange savings on the projects which have already been submitted to the government, are expected to around Rs. 40,000 crores, calculated n the basis of reduction in imports of l and other petroleum products. According to an ONGC spokesman, the ngoing projects and the new schemes ith the government for approval are kely to cost Rs. 7,600 crores. The proposed schemes, for which feasibility reports are yet to be submitted, would cost another Rs. 6,000 crores.

Additional schemes proposed under he dynamic plan of production would cost about Rs. 1,800 crores, he said. Among the schemes which are to be submitted for approval are the development of the L-II and L-III sands in Bombay High, development of PY-3 prospect in Cauvery offshore, ethane-propane recovery at Hazira and the regional gas grid for the southern region.

Such schemes also include the South Bassein — Hazira pipeline and the development of Ravva oil field and thin oil rim of South Bassein. ONGC has also drawn up various projects under its DPP for western offshore. These include development of structures like D-18, Heera (phase three), B-55, 178, 179, 80 and 172.

Among the projects submitted to the government for approval are the gas lift scheme in Bombay High, western offshore integrated development plant (WOIDP) and the development of Neelam, Mukta, Panna and Gandhar fields. Also awaiting clearance are schemes for the development of Tapti, Tatipaka — Pasarlapudi and Tripura fields, the kerosene recovery and dearomatisation unit at Hazira and the LPG plant at Lakwa, the spokesman said. According to the spokesman, the total capital outlay for the development of the Panna field is proposed to be Rs. 1148.95 crores. Peak oil production from the field, after it is fully developed, is expected to be about 1.59 million tonnes per annum, the field has an estimated geological resource potential of 85 million tonnes.

The gas lift scheme for Bombay High aims at getting an additional 49.38 million tonnes of oil upto the turn of the century. The scheme, costing Rs. 561 crores, comprises installation of gas lift platform, pipeline network and drilling of 67 wells for gas lift. The revised WOIDP with an outlay of Rs. 388 crores, has been proposed for laying a 30-inch, 144km-long trunk pipeline to the Heera complex. Another 22-inch pipeline to the truck line has also been proposed.

The scheme would not only help in utilising surplus gas to the extent of the two million cubic metres per day but also offer an alternative route for supply of oil, and gas to Uran, the spokesman said. The mid and south Tapti development scheme is estimated to cost about Rs. 802 crores. It will help in supplying 3.5 million cubic metres of gas per day to the 300 mw power plant at Pipavav in Gujarat, the spokesman said.

The Rs. 1530-crore Neelam project assumes significance because the bulk of the production increase in the Eighth Plan is expected to come from this field. It is estimated to have a production potential of between four and six million tonnes per annum. After the Rs. 1045-crore Mukta project is implemented peak oil production from the field is expected to touch two million tonnes of oil per annum and 1.4 million cubic metres of associated gas per day.

One of the most important projects to be taken up by ONGC in the Eighth Plan would be the integrated development plan for Gandhar.

The Gandhar belt is expected to yield over the three million tonnes of oil per year and 10 million cubic metres of gas daily by the Eighth Plan end.

In addition, processing of gas and condensate is expected to yield significant quantities of LPG, liquid natural gas, ethane and propane by the end of the Eighth Plan period. The total capital investment for the Gandhar project is estimated to be Rs. 1,921 crores.

Oil and Natural Gas Commission has projected a production level of 46 million tonnes of oil by the end of the current plan against the 30 million tonnes at the end of the Seventh Plan.

A revised long-term estimate has aimed at a production level of 140 million tonnes of oil and oil equivalent of gas by the year 2014-2015, the spokesman added.

ALFA LAVAL BAGS CPIL CONTRACT

The Pune-based Alfa Laval (India) has bagged a contract from Chemicals and Plastics India Ltd. (CPIL), in Tamil Nadu, for setting up a Rs. 2.75 crore 'biostil' continuous fermentation plant.

The plant is expected to be commissioned in ten months. By adopting the state-of-the-art "biostil" continuous fermentation technology, the process efficiency will be substantially improved and capacity will be increased to 80,000 litres per day.

'Biostil' process would reduce wastage by 70 per cent compared to the conventional batch system, said the company source. With the commissioning of this distillery unit, it will be the largest distillery unit in Tamil Nadu, the source added.

Decline in OPEC crude output

OPEC's crude oil production averaged 23.4 million barrels per day in January, down 600,000 from its estimated December, 1989 level, industry sources said.

The international energy agency estimated OPEC's January crude oil output at 23.3 million bpd.

Both Kuwait and the United Arab Emirates remained the main quota violators. The sources said Kuwait produced an average 1.9 million bpd in January — including its 160,000 bpd share of neutral zone production —down from 2.2 million bpd in December. Kuwait's OPEC quota is 1.5 million bpd for the first half of 1990.

UAE continued to produce more than 2.0 million bpd, and other OPEC members had hoped the country would reduce its output. UAE's quota is 1.095 million bpd. Saudi Arabia, OPEC's largest producer, produced 5.46 million bpd in January including its 160,000 bpd share of neutral zone production. This was just above the Kingdom's 5.38 million bpd quota, but sharply below its December output of 5.9 million.

Nigeria, which has an OPEC quota of 1.611 million bpd, produced 1.8 million, down 100,000 from December.

Iranian production was estimated at 2.8 million bpd, down 200,000 from December. Iraq produced 3.2 million bpd, up 200,000 from December. Both have quotas of 3.140 million bpd.

OPEC's output ceiling for first-half of 1990 is 22.086 million bpd. The Indonesian Oil Minister, Mr. Ginandjar Kartasasmita, said that OPEC may increase its current output ceiling of 22.086 million barrels per day when ministers meet in Vienna in mid-March, provided prices do not fall far from current levels.

"If prices do not really drop off if they remain above the $18 referen (price) by the time we meet in Ma it will be very difficult for us not to tempted to increase our production". told a press conference in Davos, Sw zerland.

It would take the approval of all OPEC member countries to increase ceiling and any one member could blo the increase if it so wished, the Mir ter pointed out.

Fall in price forecast

Mr. Kartasasmita said the price OPEC's crude oil basket would p bably weaken from its current $19 $17 over the next two months.

The price will weaken a bit, but as much as what some people say. production stays at present levels price drop will not be more than $2 o the next two months. It will remain about $17 in the spring period, he add

The Minister said overproduction some OPEC member countries, w had violated their quotas was contrib ting to the weakening of the marke

NEW TECHNIQUE TO DRILL O

A Norwegian company has dev loped a new technique to drill for horizontally and, according to a sta ment from the Norwegian Informati Service in Dubai, it could save millio of dollars in the years to come.

It said se l companie had u the techniqu in the past, but now the first tim , the Norway's bigg industrial grc Norsk Hydro, has b able to prod e oil om a well in Troll Field in the North Sea with new technique

In the week of las month, company ext acted 80 tonnes of from there

ix million tonnes capacity for Mangalore refinery

The capacity of the proposed Man-lore oil refinery will be raised to six illion tonnes from three million tonnes ised on the advice of the experts. The nion Petroleum and Chemicals Minis-er, Mr. M.S. Gurupadaswamy told ewsmen at Hubli on February 7 that e experts had recommended to crease the capacity to six million nnes in the second phase as it would e uneconomical to have three million nne capacity.

The proposal was pending before lanning Commission. Since the com-ission's Vice-Chairman, Mr. Rama-rishna Hegde had understood the need or Mangalore oil refinery as former hief Minister of Karnataka, the clear-nce might be expedited soon.

He said the Petroleum Ministry had leared the refinery proposals for Assam nd Mangalore refineries while the pro-osal for Karnal refinery was expected o be cleared soon. However, clearan-es from sister departments, like envi-onment, were still awaited.

Mr. Gurupadaswamy said he was hinking of developing Mangalore and Khandla as alternative ports for import f liquefied petroleum gas (LPG) since torage capacity at the Bombay and Vishakhapatnam ports had been exhausted. The ministry had a proposal o increase the LPG cylinder production capacity by one million during the Eighth Plan period.

The ministry, he said, was also keen to improve gas production in the Eighth Plan period to help overcome the power problems in the country. It would also be used as a substitute for petrol for the vehicles as was being experimented in the Netherlands.

The ministry, he said, was also think-ing of having a gas grid for southern region for comprehensive supply of gas to the region. It was also toying with the idea of supplying gas through pipelines for cities, like Bombay and Delhi, for cooking and heating purposes.

The Mangalore refinery is a joint ven-ture project floated by Indian Rayon Corporation of Mr. Aditya Birla and Hindustan Petroleum Corporation, each holding 26 per cent of the equity. Under the original memorandum of under-standing between the two, the Manga-lore project was thought of as an integrated complex — a three million tonnes refinery linked to a 2.5 lakh tonnes per annum ethylene capacity, with the original cost placed at around Rs. 1,450 crores.

The Minister's decision clearly kills the cracker complex and brings down the project cost to around Rs. 1,050 crores. It may not be to the exact liking of Mr. Aditya Birla as the integrated complex would have been the first one in the country.

The refinery will adopt the hydro-cracking technology of UOP, USA according to the detailed project report prepared by Lummus Crest of USA. The experts' decision apparently fo-llows a surplus cracking capacity being built in the country.

SEMINAR ON INDUSTRIAL GASES

The All India Industrial Gases Manu-facturers Association organised the 12th two-day national seminar on industrial gases in Bombay from February 16. The seminar was inaugurated by Mr. H.C. Gandhi, Secretary, Technical Develop-ment and Director General Technical Development, Ministry of Industry. The theme of the seminar was 'opera-tional economics and energy conserva-tion.

HALDIA PETROCHEMICALS PROJECT

Centre keen on early implementation

The Union government is keen that work on the Haldia petrochemical project is not further delayed, according to Mr. M.S. Gurupadaswami, Union Minister for petroleum and chemicals.

"We have not yet received the revised proposal for the project from the state government," he said. "May be the state government would like to have a new set of letters of intent issued now that there have been changes in the private sector partner, product mix and capacity of the project" said Mr. Gurupadaswami while speaking to newsmen in Calcutta recently.

The minister said his ministry would expedite the process of early implementation of the project. "If necessary, we will take up the matter with the industry ministry also," he said. "It will not be in the interest of the state to delay the work on the project any more."

Asked if his ministry was considering expansion of the Haldia refinery of Indian Oil Corportion in view of the huge additional demand for naphtha to be generated following the setting up of the Haldia petrochemical complex, the minister said there was no such proposal. He said the expansion of the Haldia refinery would not be viable because of the huge cost of expansion as much as that of setting up a new refinery and other physical constraints.

In the Eighth Plan, there was a proposal to set up three new refineries with a total capacity of 12 million tonnes. Together with an estimated expansion programme of three million tonnes, an additional 15 to 16 million tonnes of refining capacity was to be created by the end of the Plan. The three new refineries being considered were the Assam refinery, Karnal and Mangalore. He said however, that there would still be a sizeable demand-supply gap. By the end of the Eighth Plan, the demand for petroleum products was estimated to be around 77 million tonnes. During the same period, the domestic crude production would be about 50 million tonnes and refining capacity about 65 to 67 million tonnes. There was no getting away from large-scale imports of petroleum products. The total oil import bill which was around Rs. 6,400 crores annually was likely to shoot up to Rs. 8,000 crores from 1990-91 and after that by an additional Rs. 1,000 crores every year.

He said his ministry was exploring ways of how best gas could be utilised. Power generation should receive top priority in utilisation of gas. He indicated that his ministry and the energy ministry were currently working together to prepare a paper on proper utilisation of natural gas for power generation. The report would be placed before the government in due course. Although gas was available in plenty at Assam, Tripura, Bombay High, Cauvery basin and Gujarat offshore, he said not enough attention was paid to stop its wastages. Mr. Gurupadaswami said the shortage of LPG would continue. "We are importing LPG to meet the shortfall, but the demand is rising at a much faster rate," he said. "Besides, there are problems of unloading imports." Bombay and Vizag, the two ports handling LPG so far, were saturated and unable to handle any more. The government was looking for new ports where LPG could be handled, he said. He, however, pointed out that the ban on new LPG connections was being relaxed gradually.

Haldia project: GDR keen on entering

German Democratic Republic (GDR) is keen to participate in the Haldia Petrochemical Project through its state-owned chemical and petrochemical conglomerate, Chemiecanlagenbau, Leipzig, which already has technical tie-ups with Linde of West Germ and Voest-Alpine of Austria. This stated by Mr. Wolfgang Grabosw East Germany's ambassador to In during his meeting with the W Bengal chief minister, Mr. Jyoti B recently. "The chief minister seer very enthusiastic about our propos Mr. Graboswki observed.

He, however, made it clear that E Germany's participation in the Ha project would be strictly confined supply of technology and equipm Asked if East German technology of international standard, he repl "our technology has the backing world leaders in the field and we h to our credit, several plants in Af Soviet Union and Mauritania".

Later, addressing members of Bengal Chamber of Commerce Industry, in Calcutta the East Ger ambassador called upon business and industrialists to participate in a way in the 825-year old Leipzig due to be held in March. "The fair give you an idea of the kind of cha now sweeping the German state" observed. The German ambass pointed out that political changes w taking place at a much faster pace economic reforms. "We are now lowing an open door policy to welc every country to help modernise industries and achieve higher produ ity without disturbing environment" said. Mr. Nolte, GDR's comme counsellor in India outlined var economic reforms that had alr taken place or were likely to take p soon. These included the reductio the number of ministries from 476 t allowing foreign capital to participa the equity of East German enterp from a minimum of 49 % to a m mum of 100 % depending on the of products, delegating total auton from January next year to combines factories, till now under the minist foreign trade. Planning Commissic GDR has been disbanded and repl by much smaller planning commi

Highlights in Chemical Technology (Part 2)

CONSORTIUM ON THE HORI-ON IN USA TO ACCELERATE EVELOPMENT OF AUTO-IATED ANALYSIS

A consortium to facilitate develop-ent of automated chemical analysis chnologies — the Consortium on utomated Analytical Laboratory Sys-ms (CAALS) — is currently being ormed by the National Institute of tandards & Technology. The consort-m consisting of government, industry nd academia members, will focus on arious aspects of analytical instrumen-tion, design, including standardisation, uality control and improved software.

The meeting on CAALS held in Sep-ember last appealed for cooperation om universities and US companies. (*C & EN*, 8/14/89, p. 24).

DURAZONE-37 A NEW PRO-PRIETARY PROTECTOR FOR YNTHETIC & NATURAL RUBBER

Researchers at Uniroyal Chemical (Middlebury, CT, USA) have developed Durazone-37, a triazine compound that cts as an antioxidant for natural and ynthetic rubber. This product — ntended primarily for tyre sidewalls — gives protection from heat, oxygen, flex atigue and ozone without staining, which according to Uniroyal is a prob-em with para-phenylenediamine anti-xidants. Further, by side-stepping the need for wax, the new product elimi-nates the white bloom that can show up n rubber incorporating p-phenylene diamine. Durazone-37 is a pink to light purple powder that melts at 130°C. (*Chem. Wk.*, 11/22/89, p. 17).

A NEW FIRE-BARRIER ADDI-TIVE FROM ICI

ICI is claiming a breakthrough in fire-resistant plastics and resins with the development of a ceramic powder additive called Ceepree claimed to guarantee integrity of materials upto 1100°C. Benefits include ease of processing enhancing performance and lower heat release than traditional incorporation of a fire-resistant 'sandwich' layer.

The Ceepree additive comprises a mixture of ceramic materials of different melting points. As a result, when incorporated in plastics or resins, it melts progressively over temperatures from 350°C to 900°C encapsulating and protecting the host material. Sudden devitrification of the molten glass at temperatures between 900°C and 1000°C crystallises the additive forming a glassy barrier which retains the host's strength and integrity and allows a fire to be contained.

The lower heat release property makes Ceepree, a promising candidate for use in aircraft interior fittings particularly in light of the more stringent fire safety regulations coming into force in 1990 in USA and other countries.

The additive is being evaluated by a number of UK based resin and polymer producers. One of the most promising is in glazing rings on fire doors.

SCIENCE FICTION IN ACTION FOR CHEMICAL INDUSTRY

Gleaning white high-tech factories run by sophisticated computers and artificially intelligent software, with the heavy work done by robots, is the future for the chemical industry being made into a reality by Prof. Jack Ponton and his team at Edinburgh University. Although the university was runners up for the interdisciplinary research centre in process engineering, the Science & Engineering Research Council thought that the work at Edinburgh was so good that it awarded £1.6 million grant for the first four years of a rolling programme to the department of chemical engineering.

The programme is looking at control systems in collaboration with the University of Glasgow and seeks to continue the skills of chemical engineers and control engineers reports Ponton, who has recently been appointed to the new chair of chemical engineering at Edinburgh.

The use of parallel computers in process simulation, and research into new process structures, are also covered in the programme. Closely connected to these, but not included in the grant, is the work on artificial intelligence and industrial robots.

Industry is not formally involved in the programme, but the researcher Ponton has close ties with ICI and has also contacted B.P. and Exxon. He is currently trying to persuade one large chemicals company to apply the results of one of the projects in a demonstration. (*Chem. & Ind.*, 11/20/89, p. 734).

CONDUCTIVE LATEXES DEVELOPED BY LOS ALAMOS NATIONAL LABORATORY (USA)

It is now routine in the chemical industry to make stable coatings from a number of conductive polymers either by polymerising the material directly into a substrate or using solvent deposition techniques. These techniques are fine when the surface to be coated in small. But Matt Aldissi researcher at Alamos National Laboratory has come with a way of making conductive polymers that could be sprayed onto surfaces of virtually any size. Even the walls of a room can be painted with these materials.

Aldissi created conductive latexes by polymerising pyrrole or aniline in a mixture of water and a polymeric surfactant such as polyvinyl alcohol or polyvinyl

pyridine. As the conductive polymer forms, it binds to the surfactant, forming a bilayer. Removing the water causes these layers to collapse into spherical latex particles ranging from 50 to 450 nm, in diameter.

With modest conductivities, these latexes can make good electromagnetic shields. One can imagine painting computer cabinets — or even entire buildings — to keep electromagnetic radiation from leaking into the atmosphere, something the defence department is now testing. Perhaps defence establishments or foreign embassies can be salvaged by painting the entire building with a polypyrrole latex, and thus trapping radio signals from bugging devices inside the building.

This may seem far fetched, but its unusual applications such as this that will probably create, the first large markets for conductive polymers. The challenge with these new materials is to find unique situations, unique applications, that conductive polymers can fit into by virtue of their unusual properties. They are never going to replace copper wire, but they do not have to become a big success. (*Chem. & Ind.*, 11/20/89, p. 747).

AN OPTICAL DATA STORAGE MATERIAL CALLED DIGITAL PAPER DEVELOPED BY ICI ELECTRONICS

An optical data storage material called 'Digital Paper' has been recently developed by ICI Electronics. This non-erasable material consists of an infra-red sensitive dye coating on a polyester film substrate that is covered by a protective layer. Manufactured in continuous lengths of 1 km, the material should be adaptable to many different forms, including sheet, tape, disks, cylinders, strips and tags.

ICI claims that a megabite of information can be inscribed on digital paper for as little as 0.3 cents. (Abbott S.J., *Book of Abstracts*, 196th ACS National Meeting, Los Angeles). (1988, Poly-87).

PRODUCTION OF HIGH-TEMPERATURE SUPERCONDUCTORS IN MICROWAVE OVEN

Researchers in recent years, have employed microwave oven for production of high-temperature superconductors. This application arose from the discovery that CuO is especialy efficient at absorbing microwave energy and can go from room temperature to 550°C in a minute at 500 W.

If CuO is mixed with La_2O_3 on a brick in the microwave oven and the oven is turned on, the mixture begins to glow orange in 1 min. and is liquefied in 9 mins. Cooling produces La_2CuO_4 and further heating at medium power for 30 min. leads to the product normally accessible after 12-24 hours of conventional processing.

A series of materials are accessible this way, and the properties of the products are being evaluated for any differences from conventional products. (*Nature*, 1988, 332, 211).

TECHNOLOGY MANAGEMENT GRADUATE PROGRAMME MAKES A DEBUT IN USA FOR COMPANY EXECUTIVES

Starting in early 1990, Polytechnic University in New York will offer a new master's programme that will help working executives develop corporate management skills for technology intensive industries. The core of the university's Management of Technology Programme will contain courses in accounting, managerial economics, marketing, finance, organisational behaviour and operations management, but the focus of every course and case study will centre on the role of technology in the corporation.

According to programme director A. George Schillinger, the curriculum tures a set of newly developed cou that include the most current insi theories and lessons learnt from U European and Japanese experience accommodate working executi classes will meet every other weel Fridays and Saturdays over two demic years at polytechnic's W chester Graduate Centre in Hawtho N.Y. (*C & EN*, 8/21/89, p. 18).

AN INGENOUS SPACE WATE RECYCLING SYSTEM PRESEN CHALLENGE IN ECONOMIC OPERATION

Learning to live within your me has a new urgency when applie chemistry in space. Space travel requ a degree of water recycling not usu encountered elsewhere. Each space veller daily generates about 59 lb water for treatment. This is mostly w water, but in includes urine as wel light weight unit capable of depend handling this load during long missi is based on membrane separation.

Further constraints on space wa recycling systems include the need low power consumption (a requirem not necessary for atomic submari which have a similar need for fr water) and cannot involve chemi treatment (unless the chemicals can made on board and also recycled).

The problem hardest to handle microbial growth, which may be sol by high temperature treatment, but o at the cost of construction materi (*CMR*, 8/29/89, p. 19).

ISRAEL REAWAKENS SHALE OIL TECHNOLOGY FOR POW GENERATION

In recent years Israel has reawake interest in shale oil technology power generation. Israel's first sha fired power plant has been started u Mishor Rotem in the Negev Desert. T installation supplies steam and

egawatts of electricity for chemical ants at the site.

The unit run by Pawa Energy esources Development is viewed as e start of a 600 megawatt $500 mil- on oil shale electricity and steam com- ex that the Israeli Energy Ministry opes to complete by the year 2000 AD.

Israel has some 12 billion tons of ale reserves. Meanwhile Ministry of nergy and the Weizmann Institute of cience (Rehovat) are developing a new chnique for burning shale based on the e of solar energy instead of direct mbustion. Energy Ministry officials port the calorific value of shale is vice as high when solar energy is used stead of direct combustion. (*Chem. Wk.*, 12/6/89, p. 36).

SA PLANS FOR DISPOSAL OF TS 300 BILLION LB/YEAR RASH WITH PROFIT

The USA now produces over 300 bil- on lbs per annum (140 billion kg/yr) ash, more than half a tonne annually r every person in the country. By me estimates, plastic waste compri- es as much as 40% of the volume of ndfill waste, which has led environ- entalists, the press and legislators to ropose that this mountain of refuse be duced by recycling it.

The people who must figure out how dispose of grass clippings, old phone ooks, empty bottles and milk just in JSA are running out of room. Around 5% of this municipal solid waste MSW) is burried in landfills, about 0% is being recycled and the remain- ng 5% is incinerated, according to ranklin Associates, a Washington DC nsulting firm that studied the problem or the US Environment Protection Agency (EPA). But with the cost of andfill disposal approaching $150/ton n some parts of USA, the economics of this approach is being prohibitive. To compound the problem, the number of andfills has declined rapidly from 20,000 sites at the turn of the century to only 6,000 today. Between 1979 and 1986 alone, the number of sites dropped by 50%. Further, as worries about chemical leaching and heavy metal contamination lead to stringent environmental regulation of landfills, the number of viable permitted sites is sure to decrease.

To cope with the disposal dilemma, the EPA has decided officially to move away from landfills towards incineration, recycling and reduction of waste at the source. EPA has proposed a target of 55% landfill disposal, 25% recycling and 20% incineration by 1992.

More incineration has also been proposed for the future, not just to dispose of waste plastic, but as a way of generating energy. As fuel the energy value of plastic is high: 1 lb (0.45 Kg) of polyethylene represents about 20,000 Btu of thermal energy, the equivalent of 1 lb, (0.45 Kg) of no. 2 fuel oil. But the option of burning the waste to generate energy is meeting strong local opposition. Concerns about stack emission have led to widespread opposition to new incineration plants. Now, with debates over the greenhouse effect, the release of even more CO_2 has become attractive and the economics of disposing off fly ash from incinerator stacks may negate some of the gains of waste-to-energy conversion.

Many entrepreneurs in USA are beginning to realise that lucrative market exists for recycled plastic products. It is a new challenge to chemists and chemical engineers. Several companies are in this business. Willman Inc. of Shrewsbury, NJ., today is the largest recycler of PET containers in USA. It is turning the recycled PET bottles into fibre-fill for packets, fibre for carpeting and geotextiles for reinforced roadways, among other products.

New England CR Inc. is now at the forefront of technology for processing mixed recyclable plastics. It fabricates recycled comingled plastics into products, such as pallets, parking stops, flooring and plumbing supplies.

Another new effort is by ITC Inc. of Towson MD, which has linked up with the West German Company AKW Apparate and Verfulren GmbH in a new venture Polymer Resources Group Ind. This venture is planning to build a plastic recycling plant next year. This facility will use a process that is entirely mechanical, does not require chemical solvents and employs an advanced post-consumer waste recovery system to process mixed plastic trash. By applying multiple redundant separation steps, this plant will sort commingled waste with a high degree of differentiation. It is reported that the Polymer Resources Group will build 10 recycling facilities across the USA during the next five years.

Huge joint ventures involving big American companies such as Du Pont, Dow Chemical, Waste Management Inc. Amoco, Arco, Mobil, Polysar etc. are on the horizon in USA to give a big boost to plastic recycling in the near future. (*Chem. Eng. Prog.*, 10/1989, p.p. 67-72).

LASER PHOTOCHEMISTRY DEBUT INTO CHEMICAL PRODUCTION

The import of laser photochemistry in chemical production has been recently reviewed by P.A. Wackett in the journal Laser Chemistry. Some salient examples of interest include laser synthesis of isotopes, synthesis of fine chemicals (e.g. vit. D, hydroxy vitamin D, vitamin K, trioxane and prostoglandins) and nonstoichiometric reactions for the synthesis of vinyl chloride, ethyl bromide and cumene hydroperoxide.

Of particular interest is synthesis of vinyl chloride from KrF laser-induced dehydrogenation of dichloroethane. Dehydrogenation was achieved by using the laser at 300°C producing 75% pro-

duct yield and 99 per cent selectivity to vinyl chloride (compare the thermal reaction at 500°C, 75 per cent yield and 85 per cent respectively). The energy required to generate the KrF laser photons is only 6 per cent of the energy required to heat dichloroethane from 300 to 500°C. The process is being tested on a pilot scale. (*Laser Chem.*, (1988), 9, 75-106).

POLYMERISATION OF METHYL METHACRYLATE — AN UPDATE

Five years ago research at Du Pont revealed a new polymerisation reaction (named 'Group Transfer Polymerisation') of methacrylic acid esters and other L-activated olefins. This reaction yielded a living polymer with immense potential for synthesising new macromolecules. It now appears that living anionic polymerisation of L-activated olefins is more the rule than the exception.

MIT Reetz has recently reviewed metal free anionic polymerisation of acrylate esters using the classical Michael addition reaction of anions to 1, B-unsaturated esters. Tetra-4-butyl ammonium salts of mercaptans, thiophenols or carbon acids such as malonic acid derivatives are effective initiators at room temperature. Polymerisation shows 'living' character.

S. Inoul (Polm. Preprints 1988, 29(2)42) reports that methyl methacrylate can be polymerised by tetraphenyl prophinato aluminium methyl in the presence of light at 420nm to a high molecular weight and narrow molecular weight distribution polymer.

These new polymerisation techniques will lead to a resurgence of new polymer structures based on acrylic acid esters as monomers. (*Angew Chem. Intl. Ed. Engl.*, 1988, 27 (7) 994). (*Polym. Preprints*, 1988, 29 (2), 42). (*Chemtech*, 11/1989, p. 645).

NEUTRALYSIS — A NEW WAS DISPOSAL PROCESS CREATI CERAMIC OUT OF TRASH

The USA today is in search of a n disposal system for its trash. So is case with several developed and de loping countries saddled with the bur of piling garbage. An Australian co pany has developed a new was disposal process called Neutraly which has elicited much interest USA. The technology involves comb ing solid municipal waste with clay produce an inert lightweight aggreg (essentially a small ceramic rock) can be used to make lightweight c crete. The process is profitable and e cient and offers environmental bene It eliminates the need to dump garb to landfills or burn it. Also, the proc of converting the garbage into ro produces excess energy that can be c verted into steam or electricity for utilities. The rock like material produ is a very reliable substitute for ot building materials. The new technolo also produces scrap metal as a product. The company reports aggregate has passed all the Envir ment Protection Agency (EPA) toxic tests.

In operation, a Neutralysis plant f mixes pulverised solid waste with c Liquid waste is added to the materia form a so called extrudable pug. Fr it comes pellets that undergo a f stage 'firing' process, during which pellets are exposed to high temperatu to drive out volatile gases, oxidised the vitrified — hardened into lig weight ceramic rocks. The rock can mixed with water and cement to fo concrete. The two discharges from process are flue gas and fly ash. The gas emission can be cleaned by the c ventional air-pollution-control equ ment. The fly ash containing trace cadmium and lead may need dump in special toxic landfills. The comp plans to build its first plant at Sagin Michigan. (*News Week*, 11/13/89, p

OTLIGHT ON INORGANIC CHEMICALS

Sodium Phosphates

B.A.V.K. SHARMA
Managing Director, Sharma Consultancy Services

troduction

The various sodium phosphates represent the largest ton-ge of chemicals based on pure phosphoric acid obtained m chemical phosphorous or by solvent extraction of wet ocess acid. Their numerous fields of applications have led a sharp rise in production over the last few decades. Their plications as detergents and cleaning agents, in metal treat-ent, in the foodstuffs sector, for ceramic materials, in paper anufacture, in the textile industry and for opticals should be considered. For many different applications special osphates are required which are distinguished by bulk den-y, extremely rapid solubility, clarification in solution and ceptionally good pourability. It may be said that there is day hardly any branch of industry that does not use the char-teristic properties of some phosphate or other and it may forecast that this development is likely to continue for a ry long time.

In regard to their chemical structure, all phosphates are rived from tri-basic orthophosphoric acid in which the salts ay be described as mono, di and tri-basic or as primary, condary and tertiary, depending on the number of hydro-en ions replaced by sodium ions. The characteristic unit of e phosphates is the PO_4-tetrahederon in which the phos-horous atom is surrounded by four oxygen atoms. By link-ng several such units over common oxygen bridges, higher olecular compounds are formed. The structure of the olyphosphate is chain-like and that of the meta-phosphate, ng-like.

Polyphosphates are formed by condensation reactions, i.e. y the combination of several molecules under discharge of vater. That is why they are commonly called as condensed hosphates. They are available in crystalline or also in an morphous glass-like form. The simplest condensed phos-hate is di-phosphate (pyrophosphate) which can, for exam-ple, be obtained by the reaction of two mol monohydrogen onophosphates under certain conditions with necessary upply of energy.

$$2\,HPO_4^{2-} \longrightarrow P_2O_7^{4-} + H_2O$$

By analogy with the above equation either dihydrogen diphosphate is formed by heating dihydrogen monophosphate or, at high temperatures, a long-chain polyphosphate accord-ing to the following equations.

$$2H_2PO_4^{1-} \longrightarrow H_2P_2O_7^{2-} + H_2O$$
$$nH_2PO_4 \longrightarrow H_2P_2O_{3n+1}^{4-} + (n-1)\,H_2O$$

The individual phosphate-types have a characteristic oxide ratio ($M_2O : P_2O_5$) which decreases from the orthophosphate to the higher molecular phosphates. In the high molecular products the ratio is practically 1. The Table 1 provides brief particulars of the nomenclature, formula and structure of some phosphates.

We discuss below the manufacturing processes to produce orthophosphates, tripolyphosphates and metaphosphates.

Manufacture of orthophosphates

Wet process phosphoric acid containing various amounts of varying impurities of iron, alumina, fluorine, magnesia, silica, calcium sulphate etc. and soda ash along with caustic soda are used for the manufacture of mono, di & trisodium phosphates. It is customary to neutralise the phosphoric acid with soda ash to get disodium phosphate. This gives a pre-cipitate called "white mud" a material of complicated con-stitution containing phosphates of iron and aluminium and also phosphates of other bases present. There is a consid-erable loss of P_2O_5 in this precipitate in forms not easily recovered. Further the sodium sulphate present in disodium phosphate liquor crystallises along with the phosphate. The wet process phosphoric acid contains free sulphuric acid the same is converted into sodium sulphate while neutralising with soda ash thus a considerable amount of soda ash is wasted. In order to economise the following process is adopted.

Phosphoric acid containing monocalcium phosphate is reacted with the required quantity of sodium sulphate to pre-cipitate calcium as calcium sulphate. The acid is reacted with small quantity of soda ash to precipitate silica and fluorine as sodium silico fluoride. Both calcium sulphate and sodium silico fluoride are recovered in purer forms.

The acid is neutralised with soda ash to a pH of around 4.5. The impurities iron and aluminium which, precipitate as phosphates are removed by filtration. The filtrate is then con-centrated and monosodium phosphate is crystallised out in a pure condition leaving in the mother liquor all the impur-ities. To control the operation Na:P ratio is analysed auto-matically.

The pure crystallised monosodium phosphate is redissolved and neutralised with soda ash followed by caustic soda to produce a solution of disodium phosphate. Steam is passed to the mixture to remove carbon dioxide. The solution is

cooled in a crystalliser to yield crystals of disodium phosphate containing 12 molecules of water of crystallisation consisting of 60% water. The crystals are centrifuged and are efflorescent, losing five molecules of water of crystallisation and forming the heptahydrate on exposure to air. The crystals may be dried to yield the dihydrate containing 20% water or anhydrous salt.

To produce trisodium phosphate, neutralisation has to be done with caustic soda since the sodium carbonate is not sufficiently basic to neutralise the third hydrogen atom of the phosphoric acid. To the hot disodium phosphate solution is added 50% caustic soda solution and the solution is maintained at 90°C and filtered to remove impurities that are coming from caustic soda.

The solution is then passed into batch-type vacuum crystallisers. Crystals of trisodium phosphate dodecahydrate form are allowed to separate in a settler. The settled crystals of trisodium phosphate are separated from the remaining mother liquor on rotary vacuum filter. The crystals are further dried in rotary driers below 70°C. By drying above 100°C the hydrate loses 11 molecules of water to yield trisodium phosphate monohydrate.

A spray congealed product is made by spraying the solution of the proper concentration into the top of a tall tower. The fall through the hot air circulated in the tower dries the spherical droplets to globular form.

The manufacturing process is based on the following equations:

$Na_2CO_3 + H_3PO_4 + 11H_2O \longrightarrow Na_2HPO_4.12H_2O + CO_2$
$Na_2HPO_4.12H_2O + NaOH \longrightarrow Na_3PO_4.12H_2O + H_2O$

The theoretical quantities of materials necessary for the production of 100 parts of trisodium phosphate are as follows:

Phosphoric acid	25.7 parts
Soda ash	27.8 parts
and	
Caustic soda	10.5 parts

Actual practice shows that as far as the caustic soda is concerned this quantity is insufficient, and as a result of the increased caustic consumption it appears that the material which is called commercially as trisodium phosphate does not conform to the formula $Na_3PO_4.12H_2O$ but contains in addition NaOH, and the caustic soda necessary for crystallisation of trisodium phosphate approaches nearer 15 parts than the theoretical 10.5 parts of NaOH. Hence the so-called do-decahydrate is really a double salt, of approximate composition $(Na_3PO_4.12H_2O)_4.NaOH$.

The isomorphous salts $(Na_3PO_4.11H_2O)_4.NaOCl$, ch nated trisodium phosphate, can be crystallised from sol containing sodium hydrochlorite and this product consu less caustic soda. Another method to produce less free tent of NaOH in trisodium phosphate thereby the usa less injurious to fabrics and to individual handling is to duce saline trisodium phosphate $5(Na_3PO_4.12H_2O).Na$

There are various methods available to produce trisod phosphate:

1. Reacting with alkali solution in the same reactor in w P_2O_5 is produced from phosphorous.
2. Fusing soda ash with rock phosphate and then further tralising with alkali.
3. Processing single superphosphate with sodium sulphate alkali.
4. A by-product in processing monazite ore.

Properties

1. Mono sodium phosphate, NaH_2PO_4, mol. wt. 119.9 1.68%, O 53.34%, P 25.81%.

Monohydrate, white, odourless, slightly deliquescent tals or granules. At 100°C loses all its water, when ig converts into metaphosphate. Freely soluble in water, p tically insoluble in alcohol. pH of 0.1 molar aqueous s tion at 25°C is 4.5. Dihydrate, orthorombic colourless crys m.p. 60°C, density 1.915.

2. Disodium phosphate, Na_2HPO_4, mol. wt. 141.98 0.71%, Na 32.39%, O 45.08%, P 21.82%.

Anhydrous, hydroscopic powder. On exposure to air absorb from two to seven molecules of H_2O. Solubl eight parts water. Insoluble in alcohol. pH of 1% aqu solution at 25°C is 9.1. Dihydrate, colourless crystals, uble in 10 parts water heptahydrate, crystals of gran powder, density about 1.7. Soluble in 4 parts water at r temperature. Insoluble in alcohol, pH of 1% aqueous s tion at 25°C is about 9.5. Didecahydrate, translucent cry or granules, readily loses five molecules of water on ex sure to air at ordinary temperature. M.P. 35°C density a 1.5, soluble in three parts water and insoluble in alcohol of 1% aqueous solution @ 25°C is 9.5.

3. Trisodium phosphate, $NaPO_4$, mol. wt. 163.94 42.07%, O 39.04%, P 18.89%.

Didecahydrate, colourless or white crystals. When rap heated, melts at about 75°C. Does not lose the last mole of water even on moderate ignition. Density 1.6 solub 3.5 parts water and 1 part in boiling water. Insoluble in a hol. pH of 1% aqueous solution 15 25°C is 11.9.

Solubilities of orthophosphates are provided in Tabl

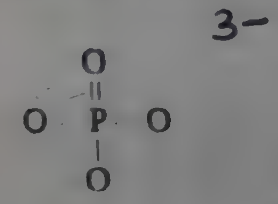
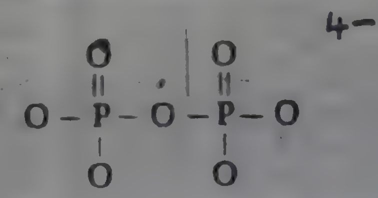
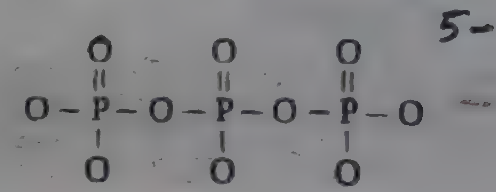
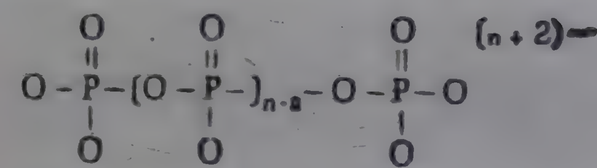
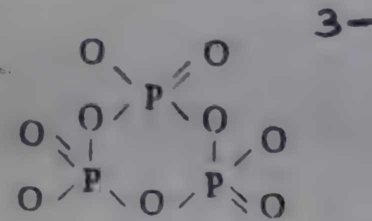
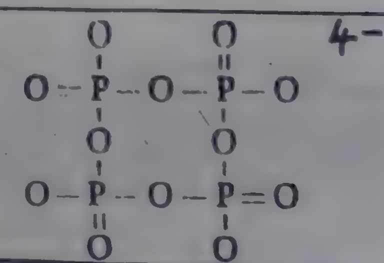
Group	Name in current use	Correct name in full	Formula	$Na_2O:P_2O_5$	Anion structure
Orthophosphates	Monosodium phosphate	Monosodium dihydrogen monophosphate	NaH_2PO_4	1	
	Disodium phosphate	Disodium monohydrogen monophosphate	Na_2HPO_4	2	
	Trisodium phosphate (TSP)	Trisodium monophosph.	Na_3PO_4	3	
Polyphosphates	Neutral sodium pyrophosphate	Tetrasodium diphosphate	$Na_4P_2O_7$	2	
	Acidic sodium pyrophosphate	Disodium dihydrogen diphosphate	$Na_2H_2P_2O_7$	1	
	Trisodium pyrophosphate	Trisodium monohydrogen diphosphate	$Na_3HP_2O_7$	1.5	
	Sodium tripolyphosphate	Pentasodium triphosphate	$Na_5P_3O_{10}$	1.67	
	Sodium metaphosphate	Long-chain sodium polyphosphate	$Na_{n+2}P_nO_{3n+1}$	$\geqslant 1$	
Metaphosphates	Sodium trimetaphosphate	Trisodium trimetaphosphate	$(NaPO_3)_3$	1	
	Sodium tetrametaphosphate	Tetrasodium tetrametaphosphate	$(NaPO_3)_4$	1	

Table II

Solubilities of sodium orthophosphates in water at various temperatures showing in grams the anhydrous substance soluble in 100 grams water

Substance	Formula	Solid Phase	0°C	10°C	20°C	30°C	40°C	50°C	60°C	70°C	80°C	90°C	100°C
Monosodium Phosphate	NaH_2PO_4	$2H_2O$	57.9	69.9	85.2	106.5	138.2						
"	NaH_2PO_4	$1H_2O$						158.6					
"	NaH_2PO_4								179.3	190.3	207.3	225.5	246.6
Disodium Phosphate	Na_2HPO_4	$12H_2O$	1.67	3.6	7.7	20.8							
"	Na_2HPO_4	$7H_2O$					51.8						
"	Na_2HPO_4	$2H_2O$						80.2	82.9	88.1	92.4	102.9	
"	Na_2HPO_4												102.2
Trisodium Phosphate	Na_3PO_4	$12H_2O$	1.5	4.1	11	20	31	43	55		81		108

es

Sodium ortho phosphates find application in the following industries.

- Animal feeding stuff industry
- Pharmaceutical Industry
- Water treatment
- Cleaning agents & detergents industries
- Metal industry
- Enamelling industry
- Paint & lacquer industries
- Electro galvanising industry
- Leather industry
- Foodstuff industries
- Textile industries
- Water treatment
- Paper industry
- Fire Proofing
- Photography Processing.

(To be continued)

Science Briefs

NRDC REPUBLIC DAY (1990) AWARDS FOR MERITORIOUS INVENTIONS

The National Research Development Corporation (NRDC) recently announced the 1990 Republic Day Awards for innovative inventions under its Invention Promotion Programme. The Prize Awards Committee has recognised developments and inventions in key areas of national importance, such as, the ELGAI process for the extraction of iron and aluminium hydroxide from low grade lateritic iron ore, SENNOVA Tea Processor for cutting, tearing and curling (CTC) of tea leaves, an improved humidifier for the textile industry, and a solar candle making machine. Cash awards amounting to Rs. 2.55 lakh for nine inventions constitute the total package of awards announced on the occasion. The following are brief outlines of some of the inventions honoured.

1. ELGAI (Enrichment of Iron percentage of Aluminous Iron ore and production of Alumina from such ore.)

Shri Vhatkar Vasant Krishnaji of M/s. V.K. Vhatkar Iron Mines, Kolhapur has been awarded a sum of Rs. 50,000 for developing an innovative process for the extraction of iron and aluminium hydroxide from low grade lateritic iron ore. Each component of the ore is extracted in the form of sponge iron, aluminium hydroxide and silica with negligible quantity of wastage/slag. The inventor has set up a plant of 10 tonnes per day capacity at Kolhapur.

2. SENNOVA Tea Processor

Shri M.R. Mohijit Sen, Proprietor of M/s. Trade & Industry Pvt. Ltd., Calcutta has been awarded a sum of Rs. 50,000 for developing a tea processing machine for cutting, tearing and curling (CTC) of tea leaves. This machine avoids pre-conditioning prior to the processing of the tea leaves thereby reducing the overall machinery, maintenance and labour cost. Over the last three years the inventor has sold 30 machines, each costing Rs. 12 lakhs.

3. Improved humidifier with a swiveling arrangement

Shri B.M. Biradar of M/s. BPL Industries, Kolhapur, has been awarded a sum of Rs. 30,000 for developing improved humidifier incorporating a special swiveling arrangement which enables the water spraying system to rotate by as much as 170° thereby maximising the area of humidification. Ensuring homogenous mixing of water particles, this device finds extensive application in the textile industry.

4. Heat wheel — An efficient air heater

Shri Mithiles Chakravarty, Scientist, Central Glass & Ceramic Research Institute of CSIR at Calcutta, has been awarded a sum of Rs. 25,000 for developing a heat wheel for recovering heat from hot flue gases. The system has a hybrid construction with fire clay bricks in the hot upper half and a metallic casing in the lower half. The packings are made of ceramic materials having high temperature stability and high thermal shock resistance.

It has special flexible seals at the top and bottom of the basket to prevent inter-chamber leakage of hot air to flue gas. The heat wheel has a high thermal efficiency, low operating pressure differential, low maintenance and operational cost and low capital cost.

5. Solar candle making machine

Dr. Pramod Behari Lal Chaurasia, Scientist, Central Arid Zone Research Institute of ICAR at Jodhpur has been awarded a sum of Rs. 25,000 for developing a Solar Candle Making Machine. The machine utilises solar energy to melt the wax, thus resulting in energy conservation. The machine is very simple to make and use.

6. Litmus granules from indigeno Rocella Tinctoria

Late Shri D.B.R. Chaudhuri, Propr tor of M/s. Indicators, Hooghly, W Bengal has been awarded a sum Rs. 20,000 for this invention. The ba lichen which grows during rainy seas and becomes dry during summer w discovered by the inventor in the coas areas of West Bengal.

The inventor has used sodium carb nate for fermentation in place of pota sium carbonate. In this process alcoh vapours are passed through ferment product, as a result of which the litm granules made have less sulphated as

7. Automatic cream filling machi with coding, foiling and capping

Shri K.U. Varunny, a Design Development Manager of M/ WIMCO Ltd., Ambernath has bee awarded a sum of Rs. 20,000 f designing a machine for filling an levelling cream in flat containers an subsequently foiling, capping an coding the containers with the prop orientation at a rate of 35 to 50 cans p minute.

8. Development of balloon load tap manufacturing process

Shri M.N. Joshi of the Tata Institut of Fundamental Research, cosmic ra balloon flight field station at Hydera bad, has been awarded a sum c Rs. 15,000 for developing a balloo load tape for reinforcing polyethylen balloons. Such balloons are used fo conducting experiments in astronom cosmic rays, and atmospheric science at high altitude.

In the process developed for manu facturing of such tape, polyester yarn i passed through polyethylene powde application unit where it picks up suf ficient polyethylene powder and the heat sealed to form a composite of poly ethylene film and polyester yarn. Th novelty of this process lies in sandwich

tows of polyester yarns between lyethylene film with clear polyethy-e flange.

RL, JAMMU DEVELOPS INDI-ENOUS SOURCE OF VIRGIN-N TYPE CEDARWOOD OIL

Virginian type Cedarwood oil has en discovered by Regional Research boratory, Jammu from Juniperus celsa MB Syn. J. polycarpos C. Koch amily pinaceae) a medium sized tree rming almost pure forests in the dry nperate regions of Jammu and Kash-r, Himachal Pradesh and Uttarkhand vision of Uttar Pradesh.

This discovery is of great interest as drol rich oils have hitherto been tained from Juniperus verginiana nn., and Juniperus procera Hochst digenous to North America and East frica respectively.

The raw material for obtaining essen-l oil consists of semi-dried terminal anches with adhering leaves. The erage yield of oil through steam dis-lation is 1.5% (w/w). The oil is of pale lour and clear consistency having a ght green woody balsamic odour with lasting note of vetiver. The physico-hemical properties of the oil are as fol-ws:

d^{15}_{15} 0.914 (α) 15D (+)-41.07°; $n^{15}D$ 498; acid value 1.15; ester value after etylation 99.01 and carbonyl value 70. The oil indicated the presence of ore than 60 compounds, of which se occurring in larger concentrations (+)-sabinene, (+)-limonene, 1,0 enthene, terpinen 4-ol, α-cedrene, cedrene and (+)-cedrol, which consti-te 22-25 per cent of total oil.

The essential oil from J. excelsa has een found to have a good scope of util-ation by perfume and flavour indus-y as a supplement to Virginian edarwood oil. The oil is also a rich urce of cedrol which solidifies even uring distillation.

A detailed survey of raw material resources indicates availability of large quantities of the raw material from Pangi, Lahaul and Kinnaur regions of Himachal Pradesh. Field trials revealed that a systematic harvest of terminal branches yield an average of 40 kg of fresh raw material per tree without caus-ing any detrimental injury to the tree. This method of harvest actually induces a fast growth of young shoots in subse-quent years. As raw material is a renew-able forest biomass, thus there is great potential for commercial production of Juniperus excelsa oil in the country.

SUCCESSFUL DOMESTICATION OF KUTKI (Picrorhiza kurroa) AT RRL, (Br.), SRINAGAR

Picrorhiza kurroa is an important alpine himalayan herb seen to grow above tree line i.e. 4,000 msl. In wild state this herb does not grow below tree line in Kashmir Himalaya. It is antiper-iodic, stomachic laxative in smaller doses and cathartic in larger doses, liver protectant and also found to be immun-ostimulant. In view of its medicinal properties, the herb is being collected indiscriminately from wild sources and thereby threatening its existence in years to come.

About two years back Regional Research Laboratory, Jammu initiated a programme of domesticating this important herb at its Srinagar branch to ensure the supply of quality of raw material to pharmaceutical industry and also to save it from extinction. The laboratory has now been successful in domesticating this crop at Srinagar (1700 msl). Complete agrotechnology of this new crop is being studied for the first time. Side by side detailed chem-ical and pharmacological investigations of cultivated stock will be carried out.

INDIGENOUS TECHNOLOGY FOR POLYPHENYLENE SUL-PHIDE

Scientists at the National Chemical Laboratory (NCL), Pune have devel-oped a process for the synthesis of a high-performance engineering plastic poly phenylene sulphide (PPS) that has wide applications in aerospace, defence, transportation, electronics, electric and energy industries. The process uses indigenous and relatively cheap organic chemicals and reactants. As of today PPS is imported from US and Japan and costs Rs. 500 a kilogram.

PPS has excellent chemical, thermal and mechanical properties over a wide range of temperatures, making it an ideal thermosetting plastic in coating and moulding applications. It is resist-ant to high temperatures and has excel-lent dimensional stability, making it a choice material for several electric and electronic applications like switchgear and printed circuit boards. Its electronic applications include connectors in tele-phone manufacture, transistors, copiers and VCR components.

The compound's remarkable dimen-sional stability (it does not expand or contract when heated or cooled) makes it ideal for watch manufacture. It is also used in the manufacture of missiles and spacecraft.

As a coating agent it is used for corrosion-proof industrial coatings, non-stick industrial coatings and in the manufacture of non-stick utensils for domestic use which employ teflon at present. An Indian plastics manufacturer has set up a pilot plant which is based on the NCL process. The pilot plant will go on stream in early 1990.

SOFT DRINK FROM WASTE WHEY

Whey, a waste product of the dairy industry, might soon be converted into a tasty soft drink through a new process developed by undergraduate chemical engineers at the Indian Institute of Technology (IIT) in New Delhi.

The process developed by students S

Bhatt and S.K. Goel working under Professor B.K. Guha at the department of chemical engineering involves the fermentation of whey with the bacterium, lactobacillus acidophilus.

The researchers believe that several million litres of whey churned out as a waste product by dairy industries across the country are currently being discarded as waste. Whey has a high biological oxygen demand (BOD) associated with it and when discarded without special treatment, it adds to pollution. But treatment processes for whey are energy-intensive and expensive.

In the new process, whey is converted into a drinkable product by fermentation to convert part of the lactose content of whey to lactic acid. The process involves inoculating whey obtained from pasteurised milk, with the therapeutically useful bacillum, lactobacillus acidophilus, at 35 degrees Celsius. The mixture is then left to ferment at 38 degrees Celsius.

In small scale laboratory tests, the fermentation occurred fast, the reaction completing within six hours. However, with lower microbial mass, the reaction time is expected to increase and side reactions will be minimised, the scientists said in their paper presented at a symposium held at IIT, New Delhi, recently.

The fermented product at a desired acidity gave a flavour and taste of lassi, the scientists said. The process could be used to produce synthetic lassi and flavouring agents could be introduced into the drink to improve the taste, they said.

-- P.T.I. Science Service

ELECTRICALLY-CONTROLLED LIQUIDS DEVELOPED

The German company Bayer AG, has developed "electroviscous liquids" based on silicon fluids containing a suspension of very finely dispersed, h and non-metallic particles. These liq exhibit a viscosity that can be altere applying electrical current, and can r resent possible applications includ one in which shock absorbers can made to adapt to new street conditi within fractions of a second, or in f switching hydraulic valves operat without any movable parts.

Depending on the strength of electrical field applied, the liquid's v cosity can be manipulated at will. electroviscous effect is produ because the particles contained in liquid are electrically charged and surrounded by alternatively char ions that come in the form of clo extending in equal parts in all directi

If an electrical field is applied, ion clouds are distorted in the direc of the counter pole such that they o lap. In the process the mobility of particles with regard to one anothe limited and the liquid becomes less v cous.

Oils that can be controlled "elec cally" in this way can be applied in industrial and technical sectors w ever mechanical forces are suppose be transmitted hydraulically, or t must be controlled with the help of e tronic switch systems featuring a electrical output. It could be applie quickly adaptable shock absorber motor vehicles, engine suspensions, tons, valves or air-conditioning syste

A simple self-operating con mechanism used in conjunction v electroviscous liquids has also b demonstrated. This could be used developing a movement sensor, instance.

The liquids are resistant to heat cold within a wide temperature ra Their viscous characteristics unde only minute changes when expose different temperatures and they do pose any hazard to the environme

Modernisation of India's ethyl alcohol production

S.L. VENKITESWARAN

India's ethyl alcohol production has been built up slowly ice 1946 as a way of gainful utilisation of the sugar indus- by product. The primary objective was to use the alcohol a blend with petrol and to reduce import requirements but er on the alcohol provided a base for organic chemicals d polymers in the late fifties and early sixties. In the last ree decades the capacity for producing alcohol has grown ten with lack of planning or clear cut objectives for eco- mic production and utilisation in relation to molasses sup- ies. The early years of very low cost molasses supplied der control by Government limited the technology of the rlier era with no cost benefits from adoption of better ethods. The control over price of the alcohol produced left tle margin to the producers and a circle of tight price con- ols and little scope for expansion of capacity resulted in ants of varying efficiencies, besides the burden of the recal- trant effluents of high BOD/COD being led into lagoons on land. There have been efforts at improved economies distillation but little in the case of the fermentation sec- on and the ready availability of compressed bakers yeast d to the use of this yeast directly instead of the conven- onal propagation of the appropriate yeast culture by the fac- ry itself. The holding of an International Seminar under the gis of the UN-ECAFE did not lead to any significant nprovements in either distillation or fermentation. Certain andards of performance were prescribed -- 84% minimum r fermentation and 97% minimum for distillation. While any plants did operate at these levels, quite a few were elow par and often the data on "fermentable" sugars in olasses came in handy for manipulations. It is realised that rmentation efficiencies could be stepped up to nearly 8-89% even by conventional batch process if properly con- olled. The general level of alcohol recoveries have been bout 220 litres per tonne of molasses of 45% fermentable ugars though this could reach 240/250 under the proper con- itions of batch fermentation.

There has been increasing concern on the effluents which as a great nuisance and even affected underground well ater in some areas. Government has taken a strict view of is problem and have prescribed very arduous BOD levels or the treatment of effluents before discharge even on land. ome relaxation has been approved in special cases but sub- ect to a time limit before adequate treatment is provided. The price of molasses and coal (for steam) have also gone up by 3 to 4 times in a decade and plant costs have also soared besides the burden of effluent treatment. The controlled price or alcohol has also gone up in proportion. We have now eached a stage where the efficiencies of production have to be stepped up to the optimum levels using new technical innovations. Effluent treatment with energy recoveries is also feasible and are obligatory for survival. It is in this context that the Vasantdada Sugar Institute of Pune organised recently in Pune a National Seminar on this subject of modernisation of conventional Indian distilleries.

The production last year is reported to be about 780 million litres at an average of about 210 l/tonne of molasses --a part of it being of low quality. The capacity is claimed to be for about 1200 million litres but a part of this is located away from molasses source (within a reasonable distance) and hence ineffective. Some plants are installed to operate on a seasonal basis but capacity claimed on a 300 day basis. **There is need to have a correct assessment of effective capacity** and because some of the installed capacity is idle it is not realistic to suggest that more capacity should not be created in areas of new/additional molasses production. The need for additional installed capacity has to be correctly assessed and as far as possible molasses produced in a state should be utilised within the State so as to reduce transport and interstate tangles. Atleast for the future there is need to have **rational planning of integrated projects wherever possible.** Minimum capacity for alcohol is a very debatable point and depends on extent of molasses transport, availability of low pressure steam and power and seasonal/all the year operation and other factors.

Presently large capacity plants above 50 KL/day or above are very few in India and most are in the range of 30 to 50 KL/day. The largest single unit todate is of 100-120 KL/day of India Glycols in Kashipur, UP and another of same capacity is under construction also in UP for Synthetics and Chemicals Ltd. The DCM group has a similar capacity but in two distillation units.. So the modernisation or upgradation is of existing units of 30 to 50 KL all on batch fermentation process and conventional 3 column distillation to get IS grade rectified spirit.

Let us have a look at what are the alternatives available for existing units.

I. Fermentation

1. Biostil continuous fermentation and distillation system.
2. Hiferm continuous fermentation system.
3. Continuous fermentation Encilium process of NCL, Pune.
4. Use of improved cultures with yeast recovery and reuse under proper conditions in existing plants.

5. "Vacuum" fermentation and yeast recycle.

II. Distillation

1. Improved distillation system with better heat recoveries.
2. MVR -- Mechanical Vapour Compression or Steam Ejector heat recovery for present units.
3. Double effect distillation units.
4. Higher concentration of alcohol in fermentation.

III. Effluent treatment

1. Fabeon Bioearth composting or other composting methods for spent wash or its concentrate.
2. Sprannihilator or burning of concentrate.
3. Biogas systems generating methane for use as fuel with different systems such as
   (a) Baccardi
   (b) AnOpur
   (c) Biopaq
   (d) SGN
   (e) Kaveri.
4. Beri Vermifilter using earthworms.

Summary of information on the above follows:

Fermentation

It is well known that reuse of yeast with considerable reduction in the generation of yeast cells using up a part of the sugars gives a 3-6% higher yield. Yeast reuse can be in batch, semi continuous or continuous systems. Problems arise with the non yeast sludge which arises and mixes up with the yeast and tends to circulate. Centrifugal separation of yeast cells overcomes this but involves higher costs. Preclarification of molasses helps in prior removal of these but requires energy (steam). However preclarification and use of a special yeast which agglomerates and settles avoids the need for centrifugation. When yeast is reused a high dose is maintained with reduction in the fermentation time. The higher the rate of conversion of sugars by the yeast, the lesser is the scope for byproducts formation. Another essential feature is the scrubbing of the carbon dioxide gas from the fermenters to recover alcohol and using this liquid for molasses dilution, thereby adding 1.5 to 2% to the yield. The combination of these factors enables the fermentation recovery to go up to 90/91% of theoretical, an increase of 6% over conventional batch system.

The major problem is to avoid contamination and ensure that the activity of yeast cells are maintained with minimal growth and degradation. Generally a minor treatment of the yeast cream is required before it goes back to the system. The problem of bacterial contamination is ensured by maintaining a high pH and the Biostil process tackles this by a high gravity and osmotic force which only the selected str of yeast (Schizo Saccharomy cis Pombi) can withstand. T is secured by a recycle of weak wash from the stripp column after cooling into the fermenter so that the non-su solids make up the high brix or gravity required without ra ing the sugar content. The effluent from BioStil has 2 t times the gravity of the usual effluent and lower volume pair of hydrocyclones before centrifuging the yeast help removal of non yeast solids from the wort. The other p cesses employ a readily coagulating strain of yeast wh quickly settles down after the fermentation and can the fore be readily recycled back to the fermenter. The ferm tation can be continuous or on a cascade of 3 fermenters series -- the hold up time is longer as compared to Bio but much less than the 24 to 30 hours of conventional bat

The "vacuum" fermentation system is different but e continuous with yeast recycle and linked to some energy s ings in the alcohol recoveries. Part of the fermenting liq is flashed under vacuum in a connected vessel when the al hol with some water goes off as vapours which are co pressed to atmosphere and taken over for distillation. I to higher alcohol content on flashing under vacuum the ste for distillation is much lower. After flashing the liquid the yeast is recycled to the fermenter along with fresh mo ses solution. The inhibition of the process by the product al hol is also avoided by this method which looks promisi

In all the continuous or semi continuous yeast reusing s tems the temperature control of fermentation is critical a is usually by circulation through heat exchangers loca externally. The Biostil process stipulates epoxy-lined f menter or stainless steel while the other systems can be m easily fitted into an existing batch system. **Detailed inve ment estimates are required case by case for arriving the most economical way towards the higher yields in f** mentation. For new plants Biostil system may have an e though costs would be higher.

Distillation

Presently many plants work on a low 2.5 to 3.0 kgm. steam per litre of 95% V/V alcohol. The steam consumpt varies with the alcohol content of the fermented wash a the arrangements for heat recoveries from vapours and sp liquor. Conventional heat exchangers are in use and the f is heated up to over 70°C before entering the column. Ex steam is required for any system for extra-pure rectified sp A few use the steam jet ejector system for heat recovery low pressure vapours) from the spent liquor but this is p sible only when steam supply is at 10 kgm. or higher. T alcohol content of the feed is 6 to 8% V/V and it is rar that higher alcohol content in the fermenter is attempted any case the reduction in steam required gets progressiv

beyond 8% with no significant reduction after 10%. The illation plants are generally well designed most of them stainless steel. In this contest the improvements have to sought through **new distillation systems which can be roduced in existing plants or which would enable)ansion of capacity with no additional need for steam.**

The distillation system is such that feed preheating can be ly obtained from the spent wash. Present system of preting in the condenser results in the same quantity of calor- being lost in the spent wash. Once the feed preheat is irely by spent wash the problem is how else to recover heat from the condenser even if reflux ratio is optimised. ere are two approaches -- one is to **run a parallel disation unit at a different pressure** so that the heat cont of the vapours in the column at higher pressure serves provide heat for the one at lower pressure -- **a "double ect"** system. This double effect need not cover both the ilyser and rectifier columns but can be applied only to two alysers at different pressures and the condensates from one led to the common rectifier. There could be a reduction of to 60% in the steam required per litre in a system on these es but no design work has been made or offered so far.

The second alternative is to generate low pressure steam m the vapour of the condenser and **compress the vapours a higher pressure (and temperature) so that the vapours n provide heat at the base of the column.** It would need compression to a level such that the boiling point is raised 30 to 35°C. The screw compressors for such mechanical por compression are available and used for other products stillation. The cost estimates are rather high with need for port and the electric power required is also large -- 600 W for a plant of 40 KL/day.

The third alternative is vacuum flashing of the liquids hich is fermenting (in a separate chamber) **and compresg the vapours for rectification at atmosphere pressure** 1 existing rectifying column). This is referred to earlier der fermentation as the process provides other advantages ch as yeast recycle cutting down product inhibition and ter overall efficiencies. Such a system deserves detailed sign analysis and a prototype unit even if the compressor quires to be imported.

There is not much scope for innovations in the present dislation system except on the lines of "double effect" or pour compression linked to flashing of fermenting liquor. here are no extraction system for ethanol/water separation of adsorption.

ffluent Treatment

The most urgent problem facing the alcohol producer is the proper treatment of the effluent after distillation. It is not a question of modernisation but a legal requirement to bring down the BOD levels to the prescribed limits. In the last two decades a number of alternative methods have emerged and proved their applicability to cane molasses waste and the conventional lagooning of the waste for 2 to 3 months cannot continue. There are two approaches -- evaporation and incineration or anaerobic digestion to reduce the BOD/COD levels to about 5000 and subsequent aerobic treatment to reduce this down to 100. Anaerobic digested waste is similar to the waste after lagooning but the process is under controlled conditions in tanks and at a much higher rate with recovery of the methane that is generated which can be used as fuel for boilers. The hold up time in the digester as only 3 to 7 days but even so the cost is high. The post aerobic treatment adds to the cost. But there are strong advocates for composting of the effluent with other organic matter like press mud from the sugar factories when a useful manure of high humus content is produced.

Work on composting has been carried out at the Walchandnagar Engineering College of Sangli with some success. One argument is that the final solid waste is not subject to the regulations applicable to liquid effluent. The cost of installation is lower but cost of handling is high and the problems arise during rainy season.

A similar treatment for the more concentrated effluent from the Biostil process (about 20% solids) under the name Fabcon Bio earth is offered by Alfa Laval. The solid matrix for the composting may be other material than press mud -- sugarcane leaf cuttings, bagasse or other agro waste. They offer a mechanical means or Aerotiller for the compost pits and a special starter culture. The carbon/nitrogen ratio gets altered in the process and the leachate from composted material has only 200/300 BOD with no colour but the inorganic material such as potash remains and may be beneficial to the soil. There is a strong case for the composting of the concentrated waste instead of incineration for which the cost of a suitable boiler is very high. An evaporation/incineration system for a 40 KL/day alcohol plant may cost over Rs. 6 crores -- thre times the cost of the production plant.

An alternative system is proposed by Proj. Counseltech under the name "Sprannihilator". This makes use of the flue gases from incineration for the direct contact evaporation stage and eliminates part of the multiple effect evaporator system. Preconcentration to about 60% solids is required for the incineration. Circulation pumps circulate the spent wash through a shell and tube reboiler where steam on the shell sides provides heat to the spent wash which is then flashed to a chamber and part of the flash steam recycled through a steam jet while the other part of flash steam at 0.4 to 0.5 Kgm/Sq. cm. guage is used for the alcohol distillation. For

incineration itself a special design fluidised bed boiler has been designed by Thermax and costs much less. Even so the evaporation /incineration is a costly option.

The preferred method of treatment is the anaerobic digestion or biogas plant which yi lds methane to the extent of 60 to 75% of the fuel needs for a distillary, thus cutting down on coal or furnace oil. This **non conventional generation** of energy attracts some incentives on the financing. The post-treatment is of course yet to be effectively tackled at reasonable costs but many alternate designs and equipment are available now, all of them now proved on cane molasses effluent in India. The success of the digestor or anaerobic fermenter which is of very large diameter depends on various factors such as the bacterial culture and how it is grown and kept up and activity maintained against flow variations and stoppages. The hold-up time has to be less than 5 days and flows/circulation maintained in such large diameter/height tanks. One way is to **maintain the bacteria as a sludge in the lower part** and the effluent flows upward -- properly and evenly distributed -- getting acted upon and the generated gas moves up alongwith the effluent keeping the bacterial blanket fully active and preventing any settling. The discharge from the top goes to a settler and any settled sludge is returned to the tank and gas collected from the top. Another way is to have a **packed media in the form of PVC strips suitably designed with high surface area and configuration.** The bacteria grow as a permanent film on this media and the effluent flowing down over these slats is subject to the bacterial action generating gas which passes up and is collected along ducts. Apart from the bacteria generally derived from cowdung, the design for flow and reaction are critical factors. The initial temperature of the effluent is at such a level as to avoid any cooling arrangements, particularly for operation range of 40 to 45°C. The tank is of Mild Steel with coating or can be of RCC. The gas is generally about 60% methane and balance carbon dioxide with about 1% hydrogen sulfide and properly designed burners are required for generating steam in the boilers. Methane can be used for chemical conversion if so desired. There are other designs with two stage digestion and first one being an aerobic acid generation stage. The bacteria can also be in small granules form (agglomerated) which can be operated as a fluidised bed reactor system. Presently designs are available from four or five overseas parties and with very nominal outgo of foreign exchange. The anaerobic digestor for handling effluents of a 50 KL/day alcohol plant costs Rs. 150 to 200 levels and reduces BOD/COD levels by 80 to 90% generating about 25 m_3 methane per kgm. of BOD.

There is now a novel approach to remove pollution and yield clean water. This is called the **BV Process or Bere-Vermifilter system** designed by Bhavalker Earthworm Research Centre which uses live earthworm to gobble up organic matter in the effluent. Earthworms function like m plugflow isothermal bioreactors. There is the supply ins the earthworms of various enzymes and the earthworm mo is a mini colloid mill grinding down any particles. T enzymes act under stable pH conditions and are released bacterial colonies inside. Some nitrogen and phosphorus m have to be added to the effluent if required. The micro ganism grow and provide food for the earthworms which th multiply to an optimum level depending on the feed. S can be recovered if required.

The Vermifilter is a packed tower consisting of the acti biomass of the earthworms and vermicastings (their excret The treatment of effluent takes place on spent wash spray from the top and treated water comes out from the botto Organic impurities and plant nutrients are absorbed by vermicastings present and are regenerated by the earthwor This is claimed to be a zero pollution process and costs expected to be low. The earthworm residues are tapped f quently serve as a soil conditioner.

Concluding Remarks

I have tried to highlight some of the problems which nearly 200 makers of ethyl alcohol have to tackle in coming years. Technology upgradation has become a cat word and so too the concept of continuous fermentati though it has been demonstrated that proper attention to process parameters and strict control can help in nearly mat ing the standards claimed by some of the new process

But it is high time that **our older standard of 84% f mentation efficiency is raised to 90% by whiche method the producer chooses.** Obviously older plants w many fermenters on batch system may prefer to change o to a semi-continuous or cascade system with better stra of yeast with recycle. Biostil system may be appropriate new plants. Distillation is by and large under control but co benefit by adoption of newer methods for heat recuperat **A stipulation on 2.5 to 2.8 Kgm steam/litre of industr grade alcohol** (depends on the pressure of steam) **needs be set down.** Most of the additional investment for exist plants will be on pollution control for which one of the bio systems now available is appropriate. Post treatment of anaerobic effluent is necessary and treatment with spec agents to adsorb and remove much of the organic matter called for so that aerobic treatment which is costly is k at a minimum level. It is time for a detailed study of the alc hol production and plan for improvments case by case so th **the promise of 10 to 15% higher output per tonne molasses can be realised even if costs cannot be reduc** The Nineties would be a decade of promise.

'hermoelectric Technology: Now and the Future

DWIGHT A. JOHNSON*

troduction

This paper briefly describes the fundamentals of thermo-ectrics including theory, construction and design of thermo-ectric coolers and where they are used. Performance ssible with today's technology is summarized and some servations are made as to where the technology is headed, rticularly with respect to low temperature cooling.

sic Thermoelectric Theory

The Peltier Effect, discovered in 1834 by Jean Peltier, scribes the temperature change that occurs at the junction tween two dissimilar metals when a current is passed rough it. This simple principle is the basis of what we call ermoelectrics.

'hat is a Thermoelectric Cooler?

Thermoelectric coolers (TECs) are small heat pumps which ust obey the laws of thermodynamics just as conventional echanical heat pumps and other devices involving the trans-r of heat energy. The fundamental difference between TECs d their mechanical counterparts is that TECs are solid state vices. This means that operation is totally vitration free. dditionally, unlike many coolers, TECs are capable of ope-tion with stabilities of less than .001°C.

A TEC is composed of a matrix of thermoelectric couples, nnected by electrical conductors, electrically in series and ermally in parallel. Figure 1 shows a cross-section of a ngle thermoelectric couple.

The thermoelectric couple consists of a p- and n- type sem-onductor material rather than dissimilar metals, because of e semiconductor's improved performance. A single stage EC typically contains one to 100 such couples sandwiched tween two ceramic plates and soldered to a thick-film elec-ically conducting circuit pattern on these ceramics. The ramic plates, which are typically aluminium oxide or beryl-um oxide, form the top and base of the cooler. They pro-ide structural integrity as well as electrical insulation from, nd thermal conduction to, the heat sinck and the object being ooled.

'hat can it do?

By regulating the direction and amount of current with the se of a feedback loop and temperature controller it is pos-

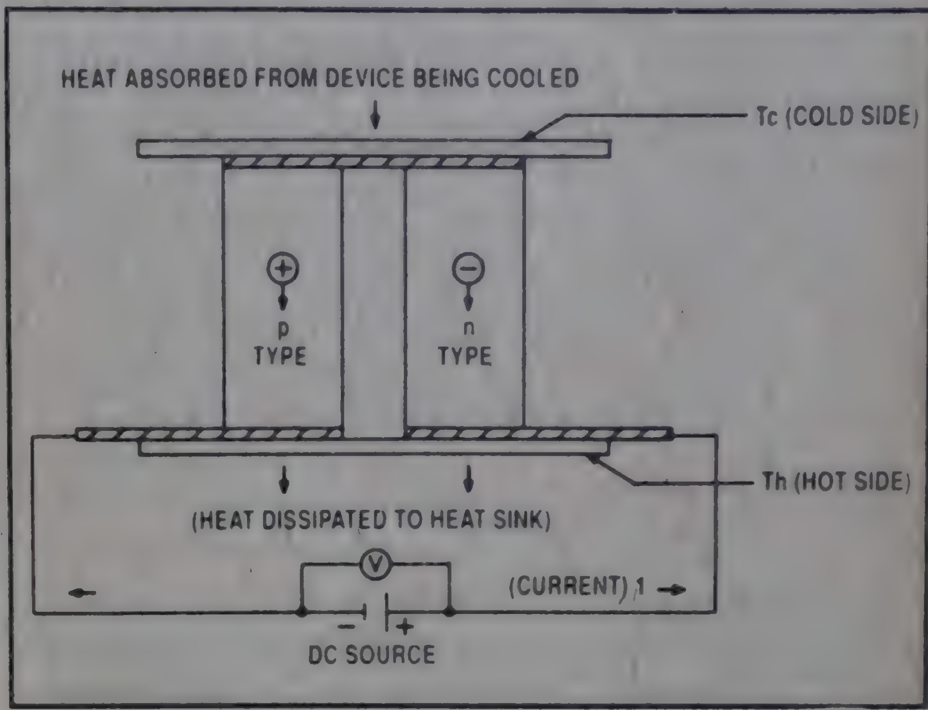
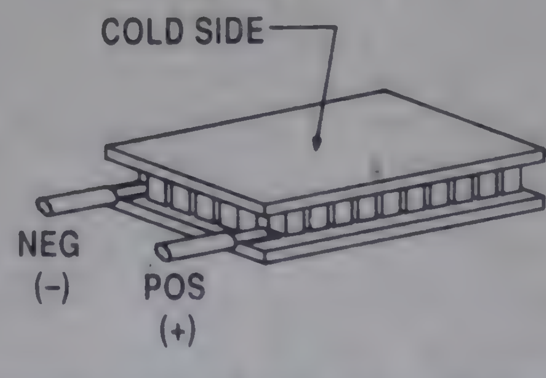


Fig. 1: Peltier Thermoelectric Couple

sible to cool, heat, or stabilize temperature. Reversing the direction of the current reverses the direction of heat pumping.

How does it work?

Put simply, when a positive DC voltage is applied to the n-type thermoelement, electrons pass from a low energy level in the p-type thermoelement to a higher energy level in the n-type thermoelement and the cold side temperature (Tc) will decrease as heat is absorbed.



Standard Thermoelectric Cooler Configuration

The heat absorption (cooling) is proportional to the current and the number of thermoelectric couples. The heat is then conducted through the thermoelement to the hot side (Th), and liberated as the electrons return to a lower energy level in the p-type thermoelement.

It is necessary to remove the heat dissipated at the hot side of the TEC and pass it on to the surrounding environment

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using a heat sink. The amount of heat dissipated at the hot side consists of the heat pumped from the cold side plus the input power to the TEC. It is not practical to achieve a successful thermoelectric cooling system without an effective heat sink to efficienly dissipate this energy.

Although the Peltier cooling is proportional to the current applied to the TEC, the power dissipated by Joule heating in the TEC is porportional to the square of the current. Half of this Joule heat must be pumped from the cold junction, the other half is conducted away to the hot side. Because of the square function, an increase in current above a certain value will result in less net cooling because the Joule heating is increasing at a faster rate than the Peltier cooling. The value of current which yields the greatest cooling is referred to as "Imax".

Performance Characteristics

TECs are typically rated by their "Maximum" values obtained at Imax with a hot side temperature fixed at 27°C. Four performance parameters are typically used when discussing a TEC's characteristics: Imax, Delta Tmax, Qmax and Vmax.

Imax: TEC current which yields the greatest net cooling.

Delta Tmax: Temperature difference across the TEC at Imax with no applied heat load.

Qmax: The amount of applied heat load necessary to suppress the temperature difference across the TEC to zero at Imax.

Vmax: TEC voltage at Imax with no applied heat load.

Because the properties of the thermoelectric material are temperature dependent, the TEC's performance is also temperature dependent and, in general, improved with increasing temperature. As with any heat pump, the efficiency of a TEC increases as the temperature difference across it decreases.

Although TECs do not have the efficiency of a typical vapour-compression refrigerator, they have many advantages. No moving parts, high reliability, independence of efficiency as a function of size, absence of harmful gases, compactness, quietness, resistance to shock and vibration, and the ability to heat, cool or stabilize temperature make TECs ideal for many applications.

Thermoelectric Materials

The advent of semiconductor research in the 1950's and the resulting improved knowledge of the physical properties of solids, and particularly semiconductors, resulted in extensive worldwide research into improving the figure of me of thermoelectric materials(1). With this, the fabrication useful devices became a reality through the development materials with sufficient thermoelectric properties to co water to below room temperature from ordinary ambient te perature (Goldsmid and Douglas 1954).

The best known materials (i.e., the materials with the hig est figure of merit, Z) for thermoelectric cooling down approximately 200K are semiconducting alloys of the (Sb)$_2$ (Te, Se)$_3$ type, and their figure of merit (2.5-3.0 10^{-3}/°C) has not changed significantly at ordinary temp atures since 1960.

Bismuth telluride is typically manufactured in one of t forms, polycrystalline or pressed and sintered. Presently, t polycrystalline material has a better thermoelectric perfor ance than the pressed and sintered material.

Polycrystalline material is "grown", and while it typica has the highest performance, is brittle and relatively dif cult to work with compared to pressed and sintered materi

Cascading

Cascading is a method for obtaining larger temperatu across a TEC than would be possible with a single stage TE A cascaded or multistage TEC essentially consists of se eral single stage TECs stacked so that they are in series th mally. A multistage TEC is typically pyramid shaped w increasing thermocouples in each descending stage becau the lower stage must pump the heat dissipated by the up stages in addition to the heat pumped from the cold sic

Unfortunately, the increase in "no-load" temperature d ferential by cascading is not directly proportional to t number of stages. This is because the lower stages are bei thermally loaded by the power dissipated in the upper col stages.

Although TECs with as many as nine stages have be build at the prototype level, presently the largest number stages built at a commercial level is six.

TEC Design

Sophisticated software developed, refined and verifi experimentally over the last fifteen years is used today model and design TECs. This software allows the design to select and optimize a TEC for a customer's particu requirements and evaluate tradeoffs which may include m imizing power, designing for specific voltage or curr requirements, size, cool-down rate, etc. It is then possible model this design (or any TEC) under various heat load, h sink, ambient, and power conditions.

For applications involving temperatures below 200K, one ethod of improving the performance of multistage TECs to minimize the radiation heat load through the use of a diation colds yield which is mounted to one of the intermediate stages of the TEC. The shiled would consist of a ermally conductive metal and enclose the upper colder ages of the TEC. This results in more efficient operation ecause the intermediate stage has more thermal pumping ıpacity.

'here are TECs Used?

Thermoelectric coolers are ideally suited to a wide variy of applications due to their high reliability, small size, ide operating temperature range, and low power requireents. Applications can be found in military, aerospace and ommercial products, laboratory and scientific equipment, edical instruments and test equipment. Following is a list some of the places where TECs have been successfully ed.

Electro-Optics: Applications include stabilizing the temerature of, or cooling, solid-state lasers, infrared detectors d charge coupled devices (CCDs) in the following:

Space Telescope Cameras
Self-Scanned Array Systems
Laser Gyros for navigation
Lightwave Transmitters
Medical Laser Equipment
Thermal Viewers
Infrared Seeking Missiles
High Resolution CCD Cameras
Thermal Rifle Sights
Black Body References.

Volume Cooling: Includes small volumes of air or liquid, and cold plates in the following applications:

Small Forced-Air Cooling Systems
Dehumidifiers
NASA Life Science Environmental Chambers
Electric Enclosures
Wafer Thermal Characterization Instruments

Miscellaneous Electronic Components such as:

Integrated Circuits for High Speed Operation
Parametric Amplifiers
Avalanche Photo Diodes
Vidicon Tubes.

Present Technology

The cold side temprature of a TEC is a function of the hot side temperature, the total heat load on the TEC, the operating environment, and the power applied to it. However, even with Zero heat load, regardless of the amount of power applied, every TEC has a theoretical maximum temperature differential which is designated as its "Delta Tmax".

This Delta Tmax is determined by the number of stages and the properties of the thermoelectric material. With a hot side temperature of 300K, "no-load" cold side temperatures range from 233K for single-stage coolers, to below 173K for multi-stage coolers.

Presently, the coldest temperatures obtainable for practical use are in the range of 175-190K using five and six stage TECs which are typically used to cool infrared detectors. To obtain temperatures in this range it is necessary to operate

paint manufacturing, adhesives and glues, ceramic, construction and mining, dry powder transfer, rubber industry, brewing plants, well drilling and many more. For details contact: Mihir Engineers Pvt. Ltd., 3rd Floor, Commissariat Building, 231, Dr. D.N. Road, GPO Box 1389, Fort, Bombay 400 001.

ANALYSER

The Viscoanalyser, developed and marketed by Metravib Instruments (565, Rue de Sans-souci, 69760, Limonest, France) is a device designed for identifying and fully defining the dynamic properties of viscoelastic materials. Although it was chiefly designed for studying polymers, as well as composite materials, rubber, paint, inks and varnishes, adhesives, glass, petroleum derivatives, leather, etc. the Viscoanalyser operates using forced harmonic oscillations off resonance. A full line of samplers makes it possible to conduct studies of solid, liquid and paste materials.

Stretch and force are two dimensions that are applied to each sample. The Viscoanalyser is completely automatic and comes with a built-in calculator that automatically conducts each experiment and carries out all necessary calculations. It also determines the sample's degree of viscosity, Young and shear moduli, loss angle, etc. A cryogenic source using liquid nitrogen makes it possible to work at negative temperatures. A potentiometric recorder lets the operator follow the development of the sample's characteristics over time.

This instrument is an ideal tool for working with raw materials and finished products. It helps define manufacturing cycles. The accuracy of its measurements opens up new research fields, particularly when it comes to determining a given material's rheological model. Finally, it can be used to quickly develop formulae. The Viscoanalyser is an indispensable tool for conducting research on new materials and for improving existing structures.

SILICONE RUBBER

Self-lubricating silicone rubb — Bayer AG's Silopren LSR 328 are used by Woco Industrietech GmbH, of Bad Soden, W. German produce high-precision insulated seals for the automotive indu because they facilitate installation increase the reliability of the electr system. The lubricating effect of oil-exuding material favours installa by automated machinery and help protect the fitted cables from dam throughout their useful life. Ano advantage of Silopren cable bushin that they do not allow dust and co sive fluids to reach the electrically ductive parts or to enter the passe compartment. The importance of t small and inconspicuous parts to safety of car occupants is demonstr by their use in life-saving antiblock tems.

Silopren LSR 3285 remains stab temperatures ranging from minus 4 to +180°C. At the places where ca pass through openings the insulat are, therefore, always softly jack and cannot wear through. The self- ricating effect enhances this protec

Within the indicated tempera range the silicone rubber retains its dielectric and mechanical proper including the resilience needed for able sealing, and also its resistanc tear and abrasion. That is why term sleeves made from Silopren keep water, oil and fuel out of the elect system permanently and prevent from escaping from the engine c partment to other parts of the veh Silopren itself is hydrophobic and re all these media. To facilitate identi tion of different cables, Woco prod the bushings in several colours. further information write to Chemicals Private Limited, Ex Towers, 17th Floor, Nariman Bombay 400 021.

Chemical News from Abroad

IONE-POULENC COURTS)RER, VALUED AT $2.3 BN

The US drugs group Rorer is in vanced negotiations for the sale of a per cent stake in the company in a al which values the whole group at .3 bn. Rorer, along with Syntex and hering-Plough, has for sometime been ped as a possible takeover target cause of its medium size and contiing more than adequate profitability. rnings per share in 1988 were $1.96.

Rorer, which for the first time posted es above the $1bn mark in 1988, is ked about 30th in the world's pharceutical companies, said a company okesman. Its principal product, which counts for sales of over $200m, is halox, the world's number one anta-l.

Rorer did not disclose the identity of negotiating partner, but Rhoneulenc, known to be searching for a pharmaceuticals base, appeared to on the brink of signing a deal. Such nove would provide a dual benefit by th increasing the French company's es in the pharmaceuticals sector and nplementing its long-term strategic n of expanding its presence in the US. would, however, raise a financing oblem for Rhone-Poulenc, which has en particularly acquisitive lately.

Other companies thought to have an erest in Rorer include the three Swiss jors, Hoffmann-La Roche, Sandoz d Ciba-Geigy, Japan's Yamanouchi d Fisons of the UK.

Around 50 per cent of Rorer's sales in the US and about one third in rope, the Rorer spokesman said. It s five main product areas: gastrointinal, cardiovascular, bone metabom products, anti-allergy drugs and od products. Rorer's commitment to e otc sector would provide any comny wanting to enter the US drugs market with useful distribution channels, commented one UK pharmaceuticals analyst.

The proposed $73/share deal is considered on the high side, but is seen as typical for a profitable US drugs company. The transaction being negotiated is modelled on last year's merger between Dow and Marion Laboratories, says Rorer. It would involve the other company acquiring around 68 per cent of Rorer's outstanding common shares and obtaining "substantial representation" on its board.

ERCROS REVIVES CHEMICALS ARM

Spain's Ercros has created a new subsidiary Erkimia to incorporate its chemicals activities. Included in Erkimia, which will have an estimated turnover of around Pta50bn ($455m), will be the chlorine, soda and chloride derivatives businesses, as well as the paints business, suggest industry sources. Ercros' wholly-owned subsidiary Ertisa, which is active in the synthesis of amines, phenol and acetones, may also be included in Erkimia.

Ercros is also reported to be establishing a subsidiary Ertoil for its petroleum refining and petrochemicals activities. The restructuring is intended to turn Ercros into an integrated group consisting of five basic divisions: FESA, involved in fertilisers; ERTM, incorporating the mining activities; EUU, involved in explosives; Ertoil and Erkimia. The Spanish company showed disappointing results in the first nine months of 1989 after a downturn in its chemicals and fertiliser sales and the shutdown of its phenol plant for routine maintenance and capacity expansion.

Meanwhile, Ercros' controlling shareholder Torras is the subject of a bid by the Kuwait Investment Office (KIO), which already holds 40 per cent of the group.

EC EYES EXXON POWER DEAL

The EC Commission is keeping a close eye on the relationship being established between Exxon Chemical France and Electricite de France (EdF) in Exxon's PP and ethylene projects on its site at Notre-Dame-de-Gravenchon in Normandy. At this stage, however, it remains unclear whether EdF will take a stake in the venture or not.

EdF claims it is taking a "normal" stake in the venture and that negotiations taking place with Exxon Chemical on electricity tariffs for the new units also fall within the normal conditions granted to large industries when they agree to switch to other fuels at peak electricity consumption periods.

Exxon, however, has refused to comment beyond saying that EdF is not taking a stake in the new venture. Discussions involve only the special tariffs it is trying to obtain because of the increased volume of electricity it will be consuming when the units go on stream. The group describes these negotiations as "normal" commercial practice. The commission, however, suspects that a low-price electricity agreement could be regarded as a form of state aid in disguise.

REPSOL FIRMS UP LATIN LINKS

Petroleos Mexicanos (Pemex), Spain's Repsol and Repsol's controlling shareholder Instituto Nacional de Hidrocarburos (INH) have signed a cooperation agreement which will result in closer links between the companies and represents Repsol's first significant move into the Latin American market. The deal also serves to consolidate Pemex's commercial presence in Europe.

Included in the agreement are a crude oil supply contract; a contract for buying

and selling shares; the establishment of a joint venture in Mexico between Pemex and Repsol to promote joint petrochemical investment projects; and the implementation of technical and technological transfer and exchange programmes. It will last initially for a five year period and can be extended.

Repsol and Pemex already have an agreement for the exchange of petrochemical products and in crude oil supply. The new agreement firms up this contractual relation and secures Repsol's crude oil supply, reflecting its strategy of strengthening its self-supply capacity.

The share agreement provides for Pemex to acquire a stake of upto 5 per cent of Repsol's share capital in no longer than two years, making it the second-largest shareholder behind INH, which has a 70 per cent share.

The remaining 30 per cent of Repsol's share capital was sold off to Spanish and foreign investors in May 1989. In return, Repsol would acquire Pemex's 34.29 per cent stake in the petrochemicals company Petronor, bringing its share to almost 90 per cent.

The two companies have already held talks with a view to identifying possible domestic as well as export-oriented investments in the Mexican petrochemical derivatives sector.

KOOR FALTERS

Israel's largest industrial group Koor Industries, whose businesses include chemicals mainly in the field of agrochemicals, has suspended payment of all interest and principal on its $950m debts.

This decision follows the resignation of Koor chairman, Arnon Gafny, who claimed that the recent engagement of the Israeli government combined with the company's trade ownership and its creditors, who are currently in talks with potential foreign buyers, has made it impossible for him to remain with the group.

Over the last few weeks two foreign concerns have made offers to gain a controlling interest in Koor, the Belzburg brothers of Canada and US company Shamrock.

ENIMONT POWER BALANCE SHIFTS TO MONTEDISON

After long awaited confrontation between top management at ENI and Montedison, it looks as if the balance of power in Enimont could swing towards the private sector, say market observers. This will follow the election of two new board members at a shareholder meeting.

Enimont is currently owned 40 per cent by Montedison, 40 per cent by ENI and the remaining 20 per cent by public shareholders. Although there are statutes in the agreement which say that neither company can increase its number of shares, there is currently much speculation that Montedison is attempting to up its 40 per cent and will benefit from the latest decision.

'It is without doubt that the two new shareholders will also be more closely allied to Montedison', said one London-based stockbroker. Therefore boosted by two more representatives it is thought that Montedison's five directors under Gardini will be able to influence major decisions within Enimont and possibly gain a majority in favour of plant closures and against politically influenced investments in the South, reckoned one analyst.

Meanwhile, there continues to be much debate over the possibility of a third industrial company entering Enimont. 'As two new shareholders are being introduced we could possibly see moves to introduce another group into the venture', said one market observer. Dow is amongst a number of companies that could be likely contenders sources. Dow recently took a 5 per interest in Montedison against Gard wishes.

However, some analysts believe considering Enimont's present inst lity and frequent rumours on the ma about the possibility of the compa wishing to leave Enimont, a third p ner would be a safeguard against total collapse of the venture.

MITSUBISHI MAKES ARISTE BID

Japan's major trading group Mit ishi Corp is to lead a proposed $8 m management buyout of Aris Chemical Corp. The announcer came as Aristech released its fo quarter results, which showed income cut to under half the figur the fourth quarter in 1988, from $34 down to $15.1m. Its full year net inc for 1989 was also sharply down 1988, from $188.2m to $82.1m.

The Mitsubishi buyout plant $26/share, is only $1/share higher the $817.5m offer made by Hunts last year. Aristech rejected Huntsm proposal in December last, saying it not in the best interests of the stockh ers and describing the offer as in quate. At that time, Aristech understood, however, to be prepar consider an improved offer.

According to industry observers buyout plan is likely to be more o lines of a takeover led by the Japa company, with Mitsubishi takin 87.5 per cent stake in Aristech. Mi ishi is expected to form a new com with Aristech's management which have a capital of $200m.

The Japanese partner will pro around 85 per cent of this. remainder of the buyout offer pri to be borrowed from a group of J nese banks led by institutions of Mitsubishi group.

The proposed buyout is Mitsubishi's st large LBO. The Japanese corporan is not currently involved in the proction of chemicals but serves as a stributor for chemicals companies thin the Mitsubishi group. Mitsubishi d Aristech are reported to have been contact for two to three years, hower the buyout plan was conceived just few months ago when Aristech proached the Japanese group request; it to take a majority stake.

ODAK UNVEILS POISON PILL AN

Eastman Kodak is introducing an nployee protection plan which would me into effect if staff lost their jobs llowing a corporate takeover. The an is being regarded as a deterrent ainst a hostile bid, to which, despite size, the company may be subject cause of its continuing lack of proability.

Unlike most such plans in other comnies, the Kodak plan provides covere for all regular employees, not solely per management. Any successful dder would face a significant bill.

The benefits include a lumpsum termination allowance equalling up to two ar's pay, continuation of health and e insurance for up to one year, a full are of any wage dividend in the year nployment was terminated, help in ding a new job and a retraining lowance.

"The possibility of a takeover is mote, but it makes good business nse to have a plan available", said hn McCarthy, senior vice-president d director of corporate relations.

CI IN OR OUT?

Industry sources say ICI will exit the rtiliser market over the next two to ree years, as the Northern European arket continues to shrink causing vercapacity. "ICI will recognise the necessity of leaving the fertiliser market in the next few years, as it is unable to gain enough of a market share", said one market observer.

Meanwhile, following French restructuring there continues to be much speculation over the future of Orkem's fertiliser business, which was recently acquired by Elf. It is believed that the business could be divided up between Elf, Spain's Ercros and possibly Enimont under a 'southern alliance'.

AKZO/AMP FORM JV

Akzo has formed a 50:50 joint venture with Pennsylvania-based AMP Inc. to manufacture printed wiring boards and related materials for the automotive, computer and electronics industries. The new venture is to acquire the business of Additive Product Co., the joint venture set up between Akzo and Kollmorgen Corp. in early 1989, for around \$50m. The related technology is also to be included in the deal.

Sales for the new joint venture in the first year are expected to reach around \$50m and amount to "several hundreds of million dollars in four to five years' time", said an Akzo spokesman.

TOTAL CHIMIE PREPARES TO RECEIVE ORKEM ASSETS

The incoming president of Total CFP Serge Tchuruk, "will find a group in good working order, recovered from the traumas of the oil shocks", said Francois-Xavier Ortoli, Total's current president who is retiring at the end of this month. He also pointed to the "excellent positions in speciality chemicals" which the group now holds with the Orkem assets which have been allocated to it under the chemicals restructuring.

All told, Total Chimie, the fully-owned chemicals subsidiary of Total CFP, should see sales jump from some FF7bn (\$1.2bn) currently to FF20bn. Total CFP general manager Pierre Vaillaud, who will soon be working with Tchuruk, indicated there would be "great continuity" in the management, commercial and investment policies of the new branch of Total Chimie. Like Hutchinson, which so far has formed the profit-making bulk of Total Chimie, the Orkem additions will enjoy great autonomy and be organised around product lines, he said.

A task force has been set up to settle the legal, financial and fiscal matters. Total will pay for its Orkem assets entirely through its own funds. However, complex financial arrangements will be involved to ensure the state's 34 per cent stake does not change. As explained by Total CFP financial manager Alain Brion, the government will grant Total a perpetual loan in the form of non-voting preferred shares. This will practically amount to an increase of the group's capital.

The group should now be able to call on the market in a more timely fashion to bolster the capital of Total Chimie. It will open up its capital to state-owned institutions such as banks and insurance companies, which will be given a minority share in the company.

However, says the Communist trade union CGT, "bringing the chemicals-related coatings and directly related specialities from Orkem to Total means a direct policy disengagement by the state from part of the nationalised chemicals industry, carried out through the medium of banks or credit establishments".

KEMIRA BACKS *SE* ASIAN MARKET

Kemira is currently consolidating its position in the South East Asian fertiliser markets and is to form a marketing company, Kemira Thai Company Ltd., together with the Thai companies, Thai Central Chemical Company (TCCC) and Thai Sunrock Company. In accordance with local law, the Thai

partners will hold 51 per cent of the company and Kemira the remaining 49 per cent.

A Kemira spokesman said the purpose of the venture is to promote sales of Kemira's NPK fertilisers in Thailand. The company will operate from TCCC's premises in Bangkok. TCCC is believed to be Thailand's largest producer of fertilisers.

Commenting on the existing fertiliser market, he said the use of fertilisers is expected to grow within Asia. Thailand is the world's largest and fastest growing export market for NPK fertilisers, with a growth rate of 50 per cent expected by 1994. Exports of NPK fertilisers to Thailand are currently running at about 1m ton/year, half of which comes from Western Europe, say sources.

Meanwhile, Kemira's UK fertiliser business Kemira Ince says that it is currently going through a consolidation period and is optimistic that business will improve as prices continue to rise and demand slowly increases.

Kemira Ince is currently upgrading its NPK unit at Ince, Cheshire. The £7m ($11.5) investment, which is due to be completed by the end of the year, will provide the company with product flexibility and introduce a series of environmental improvements to the existing unit.

ICI CUTS COSTS AS DEMAND SLOWS

Against background information provided recently by the Chemical Industries Association that UK chemicals demand will probably grow by only one per cent this year, after a four per cent growth in 1989, ICI has told its operating subsidiaries to "tighten their belts".

Sources say domestic demand is expected to grow by only 0.5 per cent this year and it is believed that ICI budget proposals for 1990 have had to be reassessed and brought into line with sales growth.

Meanwhile, commenting on recent trends concerning the environment, the group says that extra costs of meeting tougher standards may mean that it could be unable to stay in some businesses or keep some of its older facilities operational.

Furthermore, in anticipation of the projected 40 per cent growth in chemicals in the Far East over the next ten years, ICI is currently reorganising top management in this region so as to coordinate different business areas.

SANKYO SIGNALS JAPANESE PUSH INTO EC MARKETS

Sankyo, one of Japan's leading pharmaceutical companies, is to buy a 74 per cent stake in the West German drugs manufacturer Luitpold-Werk for Dm220m ($128m). A spokesman for Sankyo said the company plans to use Luitpold-Werk as a spring-board for selling its own products in Europe.

A top London analyst commenting on the move said the major benefits for Sankyo include gaining a foothold in the European market. "By moving into the European market the company is in a position to consolidate its position and familiarise itself with the market", he added. Market observers believe that Sankyo will consider further European acquisitions in the near future. Luitpold-Werk reported sales of DM205m in 1989.

This move is very much in line with the current interest of Japanese drug companies to expand overseas. Previously, Japanese companies were very conservative about entering a market where they felt their products were unsuitable and also feared tackling the major US and European companies within their home market, say sources.

However, since the mid-to-late 19 Japanese drug companies have b increasing their investments. Fujis Pharmaceutical for example invested more than $1bn in the company Lyphomed. It also holds a per cent stake in Klinger Pharma, West German company acquired Yen 8bn in 1988.

Analysts say this trend is main result of Japanese companies wantin establish their position within Europe 1992. In addition, "they realise their previously privileged positio under threat as more US and Europ drug majors enter the Japanese mark explained one observer.

Meanwhile, the 1980s have bee real watershed for Japanese compa entering the European market. M Japanese drug companies are curre looking at Western research and m toring their products to see if they be adapted and introduced into Western market.

Sankyo, which has sales of o DM3.6bn, has not had manufactur capacity in Europe before. Its multifa ted product portfolio includes drugs treatment of circulatory, respiratory central nervous system disorders, well as cytostatics, antibiotics and amins.

Luitpold-Werk has manufactur facilities at Pfaffenhofen, near Mun as well as in France, Spain, Brazil, nezuela and the US. It has a str market position in salves to relieve m cular pain and swelling. According industry observers, the German gr had been looking for increased fin cial strength in order to hold its ow the coming EC internal market.

The Karreth family, who foun Luitpold-Werk in 1910, will retain a per cent stake in the company. The d is still subject to approval by W Germany's cartel authority but b companies expect no opposition.

ORGIA ACTS TO WARD OFF

Attempting to fight off Dallas inves- Harold C Simmons, head of NL ustries, Georgia Gulf has unveiled ails of its recently announced recap-isation programme. NL Industries, ich currently holds a 9.9 per cent in orgia Gulf, initially approached the npany with plans for merger, take-er or recapitalisation.

The plan, which has been valued by company at $55/share ($1.3bn over-), gives shareholders two options. ey can either convert each of their mmon shares to $38 in cash, one are of a new series of preferred stock d one newly issued common share, or ey can convert as much as 30 per cent their holdings into new common ck. Holders would then get at least but not more than 14 new common ares for each of their shares.

The cash payment to be made to areholders and the expenses incurred ll be financed through senior bank bts of up to $730m.

OOR CREDITORS AGREE RITE-OFF

To help reduce Koor Industries' debts nearly $1bn, the company's domes-c creditors have agreed on a proposal hich has the backing of the Israeli vernment and the Histadrut trade ion federation. This will be presented he company's foreign creditors meet-g in Israel shortly.

The plan envisages a write-off by the raeli banks of some 30 per cent of the 700m of Koor debt they currently hold, lus an equivalent proportion of write-ffs by the foreign banks, owed about 200m. In addition, the Histadrut will ell assets to the government and equity ptions to Koor's creditors and the gov-rnment is to provide financial backing o Koor of $150m.

Sources say the acceptance of the proposal by all of the Israeli parties means they will present a united front to the foreign banks. Previously, foreign creditors had been extremely reluctant to accept write-offs as they had favoured restructuring.

TENSION MOUNTS IN ENIMONT VENTURE

Amid further tensions between Montedison's chairman Raul Gardini and Carlo Fracanzani, Italy's Christian Democrat minister for state participation, the board of Enimont met recently despite rumours that Fracanzani had attempted to block proceedings.

Enimont, which appointed two new directors at the meeting, is to elect a further two from the private sector on 27-28 February. These will represent minority shareholders, a move which is expected to benefit Montedison.

As tensions continue to grow between ENI and Montedison, there is speculation over the future of Enimont and possibilities that there may be a change in the control of the company. There are growing fears that if the situation does not improve the venture will collapse totally and therefore jeopardise the Italian chemical industry.

Meanwhile, in a previous meeting with Consob, the stock exchange regulatory agency, ENI and Montedison denied rumours that they had been purchasing Enimont's shares on the market or that they had been encouraging a third party to do so. Enimont also confirmed that the company's gross operating margin in 1989 was about L2.5 trillion ($1.9bn) and that consolidated profits would be in line with previous forecasts.

In the meantime, Montedison still awaits a decision, to be made over the next few weeks, about its tax situation. A meeting of Enimont's syndicated shareholders has been set for late Feb. to discuss Enimont's strategic direction and review the venture's earnings.

Most recently, the Italian government showed a more flexible position with regard to entering discussions on the future balance of assets in Enimont, without waiting for the end of the three-year "trial" period in 1991.

AQUATEC IN EUROPE

Brazilian specialities producer Aquatec has made its first entry into the European market with the establishment of AQT Quimica, a subsidiary to be based in Coimbra, Portugal. AQT is to set up a 3,000 ton/year production plant for additives for the paper/cellulose industry, as well as a range of water treatment chemicals.

Ennio Resende, chairman of Aquatec, estimates that the market for AQT's products in Portugal is worth around $6m. Aquatec wants to expand its operations either by trading its products or by setting up small scale production units. It already operates fully in the Latin American market for water treatment chemicals and has recently acquired two small companies in the US. Aquatec posted a turnover of $72m in 1989 from the production and sale of 42,000 tons of chemicals at Sao Paulo.

RORER MOVE REFLECTS R-P'S *US* DRUGS AMBITIONS

Rhone-Poulenc is on line to achieve its aims of becoming one of the world's top pharmaceutical companies, as well as gaining a substantial foothold on the US market if the proposed merger of its drug activities with those of Rorer goes ahead as planned. The merger would bring together Rhone-Poulenc's human health division, excluding the vaccines and serum division and the animal health branch, and Rorer, giving a group which would post sales of $3.2bn.

Rhone-Poulenc would have a 68 per

cent stake in the venture. Added to the 51 per cent stake which it now holds in the recently formed Pasteur-Merieux-Connaught venture, which has sales of $290m, Rhone-Poulenc should rank sixth among the world's leading drugs companies, after Merck, Bristol Myers/Squibb, Glaxo, SmithKline Beecham and Ciba-Geigy, and ahead of Hoechst, Bayer and Johnson & Johnson.

Igor Landau, president of Rhone-Poulenc's health division, who negotiated the deal, stressed it was not a hostile takeover but a "friendly merger of two companies with common goals and visions".

The new company, which will have sales of over $1bn in the US alone, will be quoted on the New York stock exchange and will be headed by Rorer's current president, Robert Cawthorn. However, the $73/share deal, which values Rorer at $3.2bn, is not final and some industry observers suggest that one of the three Swiss majors may still step in and outbid Rhone-Poulenc. One chemical analyst at Barclays de Zoete Wedd was sceptical that any new bidder would enter at this stage. Rorer has been very clearly up for sale for several years, she said, and any serious bidder would have made its move by now.

The proposed Rhone-Poulenc/Rorer merger would be based on the Merrell Dow/Marion Laboratories merger of last year. Each of Rorer's current shareholders would be offered in exchange for their shares, a package consisting partly of cash, partly of shares in the new entity and partly of "contingent value rights" floated by Rhone-Poulenc (amounting to a kind of insurance on the package value of the new company).

Because of the transfer of its human health assets, Rhone-Poulenc will pay considerably less than $3.2bn total. In fact, president Jean-Rene Fourtou said "the acquisition should present no financial problems" for the state-owned group. The company has already announced it will raise around $1bn through the sale of assets, probably some Connaught affiliates and some of the assets of RTZ Chemicals, for which Rhone-Poulenc is understood to be in the late stages of negotiating sales.

Landau is hopeful that the deal could be concluded within the next two to three weeks, but the complexity of the financial operation might delay matters, and even discourage Rorer shareholders altogether, as was the case when Sanofi worked out a complex deal to take over AH Robins a year ago.

Investigations being carried out by the US securities and exchange commission into possible insider trading in Rorer shares are not likely to concern either company, believes Landau. Recently the SEC alleged that insider dealers have made around $6m in illegal dealing in Rorer stock last month. Meanwhile, the French equivalent to the SEC has decided to open an investigation into the deal.

"The strategic logic of the proposed deal is quite clear", said the BZW analyst. Rhone-Poulenc is principally buying the US selling network which it currently lacks, she explained.

While Rorer has an absence of exciting products either on the market or in the pipeline, Rhone-Poulenc has three reasonably interesting products it plans to launch on to the US market in 1992-95, in the antithrombotic, antibiotic and sedative sectors, she said.

Meanwhile, it appears almost certain that Rhone-Poulenc will get the French state's 40 per cent share in Hoechst's majority-owned Roussel-Uclaf. It seems likely that the government will transfer its stake to Rhone-Poulenc in return for ordinary shares, thus boosting the French company's capital. Rhone-Poulenc may then sell half of that stake to Hoechst or to another French firm, raising an estimated FF2bn ($342m).

LAPORTE EYES EXPANSION PLAN

Laporte Industries says it recogni[ses] the many opportunities for it to devel[op] its three main business areas: orga[nic] specialities, construction chemicals a[nd] peroxygen products. The group, wh[ose] objectives are to develop its operatio[ns] in Germany, Italy and Spain, said th[at] with its wide geographical spread a[nd] high margin product range it was pr[o]tected against many of the difficult[ies] facing other UK chemical compani[es].

Laporte has achieved a consist[ent] growth rate of 15 per cent in pre-t[ax] profits for the past three years and a si[milar] forecast has been predicted by t[he] company's chief executive Ken Mint[on] for 1989 and 1990. The company is al[so] looking to develop its position in S[E] Asia and is manufacturing both [in] Sydney and Melbourne.

HUNTSMAN PREPARES ARISTECH RIVAL BID

Huntsman Holdings Corp., controll[ed] by Jon Huntsman, is to submit a ne[w] bid for Aristech Chemical Corp riva[l]ling the $844.5m offer made recently b[y] a management buyout group headed b[y] Japan's Mitsubishi. Huntsman made [a] $25/share bid, totalling $817.5m, la[st] year but this was rejected by Aristec[h] which claimed the offer was inadequa[te] and not in the best interests of its shar[e]holders.

Huntman's new offer, which is cu[r]rently being worked out, is to be mad[e] by its affiliate Banstar Corp. shortl[y]. Huntsman sent a letter to the speci[al] committee of Aristech's board of dire[c]tors formed to assess the Mitsubishi de[al] urging it not to approve or enter into an[y] transaction with Mitsubishi befo[re] receiving Huntsman's formal propos[al].

"We remain enthusiastic about th[e] benefits to be derived from the comb[i]nation of Banstar and Aristech", sa[y]

ntsman in the letter. Representatives n the two companies met on several asions last year to discuss Jon ntsman's ambitions to acquire some stech assets, although at that time, omas Marshall, Aristech chairman ceo, remained adamant that Aris- n was not up for sale.

Huntsman is interested in particular Aristech's polypropylene assets. Aris- n operates two plants in the US with ombined capacity of 317,000 ton/- r. The addition of this to Huntsman's n PP capacity, which totals 159,000 /year but which is due to double ough expansion in 1991, would take ntsman into second place in the PP rket behind Himont.

However, due mainly to sliding prices PP, the conflict over the future of stech comes just at a time when it announced sharply lower earnings. vertheless, shares in Aristech rose by most 30 per cent on the news of the tsubishi deal.

Mitsubishi and Aristech are under- od to have postponed their decision the proposed buyout for some time. istech announced that it is actively king proposals in excess of the exist- $26/share offer.

J PONT DIVESTS PE PIPE ANT

Du Pont Canada has sold is polyethy- e pipe plant in Saskatoon, Saskatch- an, to Wiik & Hoeglund (Canada) for undisclosed sum. The plant has a acity of 11,400 ton/year. Du Pont l continue to supply resin for the ope- ion. Wiik, a subsidiary of a Finnish ducer, also has a plant at Huntsville, tario. It will manufacture gas distri- tion pipe from 0.5-4 inch diameter for Pont.

ASF REVIEWS STRATEGY TO OOST CORE BUSINESS

West Germany's BASF is understood to have completed a major strategic review, which is to be discussed by the board at the end of February. This is likely to include both divestments and acquisitions in unspecified areas, indicated Dr. Ronaldo Schmitz, BASF finance director, at the company's first international analysts meeting.

The company is going through a strategic review, emphasised Schmitz, which would result in taking steps to strengthen sectors it regards as core business and perhaps divesting others not seen as so vital.

Certainly, according to industry analysts, BASF has several underscale businesses, and steps may have to be taken to either build these up or consider divesting them.

The crop protection section of BASF's agricultural chemical division, for example, needs to be strengthened to worldwide dimensions, said one London chemicals analyst. Just last December, in the light of the poor agrochemicals business climate, Schering and Sandoz took the decision to consider merging their agrochemicals operations. According to investment analysts Morgan Stanley, BASF is ranked about seventh among worldwide agrochemicals producers in a field where competition remains intense and where it has a relatively small line of new products in the pipeline. It may well therefore be considering looking for an acquisition or joint venture in this area.

In the same division, steps may have to be taken in BASF's fertiliser activities, which have been hard hit by the decline in ammonia prices. After suffering losses for several years, however, this sector has returned to profitability.

Although prospects for the fertiliser business remain dim, BASF has a long history in the field and it "would require quite some soul-searching to divest this business", commented one analyst at Credit Suisse First Boston. This does not rule out the possibility of BASF divesting its 75.5 per cent stake in Kali & Salz, whose performance has also been suffering lately, he added.

CSFB also pointed to the group's struggling information systems sector, including not only magnetic tape but IBM compatible systems and software packages through its joint venture, Comparex, with Siemens. It is difficult to see synergies between this and the group's mainstream chemicals activities, commented the analyst.

The group is known to be keen to expand its relatively small pharmaceuticals arm, Knoll, which accounts for under 3.4 per cent of total turnover, well below its competitors, Bayer, Hoechst and ICI. Although expansion will be largely internal, an acquisition in this area appears likely, say analysts at County NatWest Wood Mackenzie. A move is also expected in the polyurethane sector, they say.

Meanwhile, the group has confirmed its plans to spend DM4.7bn ($2.8bn) in capital investments in 1990, an increase of 15 per cent on 1989 and topping DM4bn for the first time.

Over half of the funds have been earmarked for the main production site at Ludwigshafen and other group facilities within West Germany. Outlining its spending plans for production sites abroad, BASF said its Antwerp complex, the group's largest foreign base in Europe, will receive 12 per cent.

The group's largest single project will be the MIDAL natural gas pipeline to be built by subsidiary Wintershall at a cost of DM750m. Wintershall is also likely to continue to be in the market for further acquisitions in the oil and gas sector. It is unlikely that Wintershall would feature in divestment plans because it provides BASF with an effective hedge against increases in raw material prices.

Chemical Markets Abroad

AMMONIA Q1 CONTRACTS SHOW SIZEABLE RISE

Ammonia prices have bounced back in the first quarter of 1990. Contract prices for Q1 have been settled at \$125-137/ton c & f Spain, up from \$87-103/ton in the previous quarter. Traditionally ammonia numbers rise in quarters one and two as fertiliser players position themselves for the spring season. However, the current upturn is fuelled by several additional factors.

Higher freight rates have pushed up ammonia price ideas in the early part of this year. Vessels which have transported ammonia switched to LPG to cover shortages in the US Gulf, caused by the recent cold snap. This coupled by the fact that the majority of large carriers are either contracted or on long time charters hiked numbers rapidly. Some ammonia players claimed frieght rate quotations are almost double the December figures. Although US LPG demand has now slowed, as weather conditions improve, freight rates have yet to drift down.

India's reappearance in the ammonia market has helped support numbers. India limited purchases of ammonia in 1989, after falling out with its Middle Eastern phosphoric acid suppliers. Instead of producing DAP domestically, India bought on the merchant market. India has tendered for 50,000 ton initially, against its usual half yearly requirement of between 300,000-450,000 ton. Observers believe further purchases will be made, if the current tender is concluded successfully.

Rising gas feedstock costs have also added to the push for higher prices. In the US gas prices have risen by over 30 per cent in the last few months. Although it is still too early for the US ammonia season to take off, speculation around this is helping fuel hikes. The USSR appears to be exporting less than expected, after the record year of 1989.

Spot ammonia prices have tracked the improvement in contracts. Spot prices now stand at \$125-130/ton, up from the low \$80s of quarter four. It appears that demand is seen as steady rather than strong. Although some higher numbers have been voiced by the market these do not appear to reflect the general trend.

NEW SHIPPING POOL LAUNCHED

A new chemical shipping pool has finally emerged. The development had been expected in quarter four. Seachem Tankers Ltd., as the new venture is to be called, will consist of the chemical carriers of Ceres Chemical Tankers (UK) (a subsidiary of the Livarnos group of Greece), Fearnley & Eger of Norway and Nedlloyd of the Netherlands. Seachem will consist of 22 carriers between 30,000-40,000 dwt in size covered by IMO two and three standards.

The head offices of the shipping pool will be at Kingston in the UK. The group hopes to consolidate its current business before considering expansions. It is believed that Seachem Tankers will immediately be one of the top four chemical tanker fleets in the world, elevating the partners from the ranks of medium size players.

A Nedlloyd spokesperson said the new shipping pool would be especially strong in the movements of caustic soda to Australia, where it will be the biggest carrier. Bulk chemical movements from the US Gulf to the main Far Eastern ports would also be a strong route for Seachem, as would the movement of vegetable oil from South East Asia to Europe and the US Gulf.

Although the individual owners have been operating these routes, the new pool will allow for more sail increased reliability and added sta for customers, says Nedlloyd. Con will provide the majority of busine Seachem, but size of the fleet will for increased competition with majors in the spot market.

One partner, Ceres Chemical T ers, came to prominence last year the buyout of the Canadian Pa chemical tanker fleet. It is believe the majority of vessels from the e deal will be incorporated into the shipping pool. Nedlloyd will s four vessels to the pool, three of w it owns and one which is on a long time charter.

Seachem Tankers will have sub ary offices in the United States an Far East. Management of the new will be centred in the UK, as will mercial developments and vessel rations. However, with each of individual companies currently ha separate centres of operations, how will work in practice remains unc

BASF INCREASES MMA CA CITY

BASF has commissioned a methyl methacrylate plant (MMA methacrylic acid unit at its main wigshafen works. The new unit produce 35,000 ton/year of MMA 5,000 ton/year of methacrylic BASF is utilising its own techno

MMA is an important starting in the production of acrylic poly and dispersions. BASF rec improved its vertical integratio acrylic polymers through acquisiti Spanish acrylic sheets producer Cr A year ago BASF bought the German acrylic sheets producer R

BUTADIENE NUMBERS RISE MARKET MULLS OUTAGES

Price prospects for butadiene a bullish for the near future, as the

ket gives no sign of relenting. In the ntially integrated transatlantic ket, the shortage of C4 feedstock been exacerbated by the outage in JS of the largest production unit at lips' Sweeny cracker (approxi-ely 680,400 ton/year). This comes the partial downing of Exxon's on Rouge complex and the spate of zing weather in the Gulf had taken toll on C4 production.

e effect can only be to increase US and for European product, and this translated into price hikes. The nt of these is, however, clouded. pean producers indicate US spot es have reached 34 to 35 cent/ nd, in a context of major US pro-ers having to cut back on delivery mes as they are extremely short of uct.

onfirmation of these numbers has difficult to obtain from the US, re numbers as low as 30 to 31 cent/ nd have been voiced. Traders appear ve substantially withdrawn from a uct now extremely difficult to find ide inter-producer exchanges. A ber of major suppliers in NWE been behind the movement of par- to the US. With the virtual absence trader spot movements within pe, US price ideas are dispropor-ately affecting European numbers. is behind the figures of $600/ton over quoted for January. A deal as as $640/ton fob Rotterdam has talked of, which would translate to nd 35 cent/pound FD in the US. tion is now focusing also on con- developments in the US, where the ent/pound level is to give way to ls of 29 cent/pound or higher.

Europe, producers are quoting bers sought for first quarter n-s in the range FF3,100-3,300. One ment voiced in support this hike, ently meeting consumers' resis-e, is that last quarter's numbers have outstripped by prices offered by customers. The FF2,800/ton FD figure translates to approximately 28 cent/pound, below prices currently available.

Technical problems have been a recurring factor in Europe over the long tight market since last summer. They are, however, only partly behind it. It is felt that the industry allowed stocks to be depleted when the bearish price trend for the product inverted last April/May. The beginning of butadiene's climb coincided with the downturn in ethylene.

Some producers have stressed that the absence of spot material in an overwhelmingly contract-traded market remains a factor, no matter how marked, concerning marginal quantities. In Europe, the market imbalance is from the producers' viewpoint insufficient to suggest any change of cracker severity, which is determined instead with an eye to the larger volume co-products, ethylene and propylene.

STORLI BUYS OUT SHIPPING PARTNER

Storli Shipping has purchased the chemicals shipping arm of Westfal-Larsen in a move worth $280m. The deal involves some 13 tankers and signals the demise of Odfjell Westfal-Larsen, the chemical shipping pool owned by Storli and Westfal-Larsen.

The acquisitions give Storli 100 per cent ownership of nine stainless steel tankers and partial ownership in four others. At a single stroke Storli has increased its fleet's tonnage by almost 300,000 dwt and now appears to have the second largest chemical fleet, with 34 vessels at over 400,000 dwt. Only Stolt Tankers and Terminals is thought to have more ships dedicated to chemical transportation.

Storli will acquire Westfal-Larsen's 50 per cent stake in Baytank, the Hous-

ton terminal and tank storage complex, of which it already owns 50 per cent. The deal will also provide the company with a further share in Odfjell Westfal-Larsen Tankers A/S, Odfjell Westfal-Larsen Chartering A/S plus a percentage of other Westfal-Larsen companies and offices worldwide.

STYRENE OUTAGE BOOSTS PRICES

Styrene prices, which have soared since the last week of 1989, gained a further boost with the shutdown of the 140,000 ton/year Taiwan Styrene Monomer Corp. plant. It is understood that a fire and explosion in the ethylbenzene unit led to the closure of the styrene plant. Although the styrene unit is expected to be operational within a month, no time limit has been given on when the ethylbenzene plant will be operational.

Far Eastern buyers have increased the level of enquiries. Before the outages, Korean and Taiwanese buyers were reluctant to pay figures of $1,000/ton fob. Now sellers have supposedly rejected offers of $1,170/ton fob. The difficulty facing Far Eastern buyers is that no spot material is available in the US, forcing interest to centre on Europe. No Asian business has been concluded at the higher levels of $1,190-1,250/ton fob NWE, current European spot prices. However, observers are confident that eventually deals will be done at the new higher levels.

Styrene contracts, which had appeared near conclusion in the first week of the year, have now been set back. A settlement is expected shortly. Two other contracts have been concluded. Paraxylene has finally been fixed at DM940/ton, a drop of DM285/ton on quarter four. The first ethylene contract has been concluded with DM850/ton as the upper end of the agreement.

BRAZILIAN REVENUE

Revenue from Brazil's chemicals industry is expected to have reached $12.7bn in 1989, an increase of 5 per cent over 1988, according to estimates from the industry association Abiquim. Exports fell by around 8.2 per cent over the previous year to $1.8bn. With imports standing at $2.34bn in 1989, this gives a $460m deficit compared with a $78m deficit in 1988 and a $200m surplus in 1987.

EVAL HIKES EVOH

Eval Co. of the US has finished the debottlenecking and maintenance work at its ethylene vinyl alcohol resin unit, in Pasadena, Texas. The plant now has a nameplate capacity of 11,300 ton/year, up from 10,400 ton/year. The capacity is needed to meet the grov demand for the vinyl alcohol re Eval markets its products thrc Evalca, a joint venture between Q tum Chemical Corp. and Kurara Japan.

Evalca is considering adding a line to the ethylene vinyl alcohol r unit in Texas. Plans have reached initial engineering stage.

BRAZIL POISED TO IMPORT AFTER METHANOL RULING

Brazil could shortly resume effo import methanol. A federal court overruled an earlier judgement lower court banning methanol imp The court ruled that methanol can be imported and distributed as a

Several favourable reports have issued since the original December ban. Ibama, the environmental inst of Brazil, recently issued a study porting methanol's use in an etha gasoline mix.

The Sao Paulo Environmental Pr tion Agency has supported the gov ment in its attempts to have the im ban lifted, as has the Federal H Ministry which supports a 33 per methanol concentration in ethanol trial period.

larket observers have indicated that n methanol being so tight Brazil is ng to have difficulties sourcing up to),000 ton/month over a six month iod, which is one estimate of its ds. Originally it was believed that zil would attempt to import up to m ton of methanol, but this figure has w been revised downwards.

So far Brazil has managed to secure proximately 20,000 ton of methanol m the US and one cargo of 40,000 from Chile. It is generally thought t Chile would be the logical source methanol, supplying material from 750,000 ton/year Cape Horn meth-ol plant. However, a company okesperson for Cape Horn declared t the large majority of Chilean meth-ol is already spoken for on contract, aking it extremely unlikely that it will available to meet Brazil's needs. It doubtful whether more than 80,000 n, representing two shiploads of Chi-an product will be available on the ot market, said the spokesperson.

Methanol was tight throughout quar-r four last year and has continued so quarter one this year. This is reflected rising contract prices. Quarter one set-ements show a hike of DM50-60/ton n quarter four. Libya, a major pro-ucer, has only recently recommis-oned its two methanol units, which ave been out of action for a number of weeks. A series of maintenance shut-downs, coupled with capacity cutbacks in the second half of 1989, is still affect-ing supplies.

With Sabic undergoing a mainte-nance turnaround for the whole of Feb-ruary, methanol availability is not set to improve. The USSR also appears to be exporting less, due to strengthening domestic demand on its gas feedstock and continuing logistical and distribu-tion problems.

Until it becomes clear how much methanol Brazil is actually going to demand players seem reluctant to spec-ulate. Since the end of quarter four spot methanol prices have risen by DM20/ton, with further jumps pre-dicted.

US methanol, another potential source for Brazil, continues to rise in price. Contracts for February have already been posted at 42-44 cent/gal-lon, marking further considerable rise over the past months. Price hikes have been due to substantial rises in gas feed-stock. A number of scheduled mainte-nance turnarounds have further tightened supply.

Romania has declared force majeure on its commitments adding to reduced methanol availability. Methanor in the Netherlands is thought to have produc-tion difficulties, also diminishing output.

BRAZIL REPORTS CHEMICALS UPTRUN

Brazil's chemicals, plastics and paints association have noted an overall turn-over of $17.5bn for 1989. Abiquim, the country's chemical association reported turnover figures of $12.7bn, a five per cent hike on 1988. The sector's trade balance showed a deficit with exports of $1.8bn and imports of $2.3bn.

In 1988 Brazilian chemical exports reached $2.04bn. The Brazilian plastics association Abiplast posted turnover numbers of $3.2bn for 1989, marking an upturn of seven per cent on 1988. Some 1.8m ton of thermoplastics pro-duced in the country were converted domestically, with exports accounting only for $170m of turnover. Convert-ers are preparing to cope with planned petrochemicals investments of $6bn in the coming years by improving output and looking for new applications.

Petroquisa, one of Brazil's largest polymer producers, saw exports drop to $670m in 1988, a fall of some 30% on 1988 figures. Lack of export opportun-ities into China and high domestic demand is behind the slump. Most developments in 1990 seem to centre around domestic investments of $1bn, with export potential remaining low.

Paints output grew by seven per cent in 1989, according to Brazil's paint association Abrafati. Overall turnover jumped by six per cent, generating capital of $1.6bn. Paint production reached 820m litre in 1989, up some 50m litre on 1988. Producers are expected to stick to 1990 investment figures of $150m.

The country's fertiliser consumption dropped 14 per cent in 1989 to 8.3m ton. Petrofertil, which was created by Petrobras to counter the lack of private investment, posted turnover levels of $680m, a 9 per cent drop on 1988 figures.

POLYURETHANE FACES GROWTH PROBLEM

The European polyurethane industry has a number of potential problems to resolve if the dramatic growth rates enjoyed in the 1980s are to continue, sayd UK consultant IAL. New growth markets have to be found to replace those now reaching maturity. Some resolution seems necessary on the level of competition between reaction injection moulding techniques (RIM) and engineering thermoplastics, both used in the manufacture of automotive components.

It is estimated that European polyurethane chemicals reached 1.414m ton in 1988, about 33 per cent of world demand. European growth is forecast to average 2.7 per cent into 1993, bringing demand to 1.615m ton.

The major end uses of polyurethane products will grow only by up to 5 per cent/year, while niche markets could enjoy up to 10-15 per cent/year growth rates, says IAL. Demand for aromatic isocyanates used to produce MDI is forecast to show healthy improvement says IAL. MDI demand is predicted to grow at 7 per cent/year with TDI growth down to 2 per cent/year.

In sharp contrast, aliphatic isocyanates are predicted to show a 10-20 per cent/year upturn in consumption — the main areas of growth will be in coatings and paint applications. Other issues yet to be resolved by the polyurethane industry are environmental concerns, such as the impact of CFC reduction, and the possibility that Europe will follow the UK's lead in implementing tougher legislation on furniture foam.

Rigid foams account for some 26.5 per cent of polyurethane consumption, with growth into 1993 predicted at 3 per cent/year. In Europe, building and appliance insulation accounts for a large share, but this market is now seen as reaching relative maturity. Polyurethane is not expected to increase its share of the thermal insulation market much beyond the present level of 5-6 per cent, indicating the potential weakness of the building and insulation market.

AUSTRALIAN BOOM

Australia's chemical industry show a sales growth of 17 per cent, exp sales growth of 25 per cent and after-tax profit surge of 58 per cent 1989, according to figures released the Australian Chemical Indus Council (ACIC). Total sales amount to $3.8bn, while after-tax profit w $381m.

The chemical industry outperform Australian manufacturing and GD despite a "dramatic scaling down tariff protection", said ACIC. It bas this result on the increasing relian throughout the world on chemical pr ducts, import substitution and risi exports.

ABS MAKERS FACE STRONG POLYMER COMPETITION

The acrylonitrile-butadiene-styre (ABS) market is revealing structu weakness, as soaring prices for t increasingly tight styrene and butadie feedstocks have failed to bring any vi ible support to the derivative produ A partial explanation for ABS pric being insulated from the influence those of upstream feedstocks is t degree of specialisation characterisi

product. Specific customer needs are ɔng determinants of the speciality ɔplied and of the price.

Producers, however, appear con- ned by their exposure to feedstock ce hikes, which they cannot effec- ely transmit to the end-user markets. e automobile parts sector finds the gest volume application, where ABS closest to a general purpose commo- y rather than a speciality.

The market price for "automobile ck" — i.e. general purpose — ABS, ges from DM4.0-4.3/kg in Germany. is is indicative of the European aver- e, with numbers still under some pres- re from converters in France and Italy. Spain the product has stabilised after ing way on numbers last quarter. UK ces, while holding up in nominal ms, have fallen below the European erage due to the weak pound. In the ht of this, GE Plastics is asking for -10 per cent hike in UK prices from bruary.

Producers give contrasting signals on effect of the supposed seasonal wnturn, with a spokesman for Mit- bishi reporting some drop in demand om UK customers in December/Jan- ry, but GE Plastics declaring itself to producing flat out to meet demand. similar picture emerges from Dow, rrently producing at over 90 per cent pacity. It plans to bring on a new train production at Terneuzen by the third arter of this year.

It is in the development of new spe- alities that ABS producers see future portunities. The product is finding its tomobile industry end-market under reat from polystyrene's successful ice competition, and from the namic growth of polypropylene use. e ABS industry therefore aims to hieve properties distinct from those fered by other materials. In this con- xt comes the development of high- eat specialities with improved mechan- al and sound properties, polycarbonate/ABS blends and glass-filled varieties. High-heat ABS is currently traded within a price range of DM4.0-4.5/kg.

Despite the efforts to defend ABS's share of the polymers market, automobile-related demand for the product will register a decline of three per cent/year over the 1990-92 period.

ETHYLENE Q1 CONTRACTS EMERGE

The ethylene market has seen a considerable number of contract settlements for the first quarter. Before the latest numbers emerged, Orkem and Solvay were settling on an average of DM897.5/ton FD for Q4 1989 and Q1 1990 combined. The French group concluded another contract at DM865/ton FD. The partner is believed to be Enimont, which now has a joint interest with Orkem in the Dunkerque cracker.

Lower numbers have begun to emerge. A DM850/ton settlement between Veba and Solvay is indicative of a lower delivered price once transport costs have been taken into account. Hoechst is said to have settled with all its major suppliers at DM835/ton, with allowance for delivery cost arrangements.

The extent of the drop in numbers from last quarter's DM925-950/ton FD came as a surprise to some, of the market. Firming ethylene spot numbers on the back of deep seas scarcity and the hike in naphtha prices has prompted producers to initially voice hopes for DM860-870/ton FD.

Orkem's two-quarter average settlement with Solvay, furthermore, would indicate a perception of this quarter's price as being DM860/ton FD assuming a fourth-quarter indicator of DM935/ton FD to be valid. There is a speculation in the market that scheduled capacity additions may be having their effect on producer' ability to resist price cuts.

EC RENEWS GSP ENTRY TARIFFS

Less developed countries will continue to benefit from duty-free allowances for their chemical exports to the EC in 1990. The EC has released the ceilings exempt from import tariffs under its Generalised System of Preferences (GSP) scheme. Among the most important products subjected to ceilings is styrene, with an Ecu8.925m ($7.5m) limit; Saudi Arabian product, is however, the subject of a stricter limit of Ecu3.5m above which tariffs are imposed. Methanol will be allowed duty-free into the EC up to a value of Ecu8.4m; ethylene glycol reaches its ceiling at Ecu3.78m, and ammonia's allowance is Ecu6.825m.

Among the plastics, linear polyethylene, polystyrene and PVC are free of duty up to Ecu12.5-13m (depending on gravity), Ecu4.305m and Ecu5m respectively.

PA MARGINS SLIDE FURTHER

Phthalic anhydride contracts look set to lose ground on 1989 quarter four figures, as players near agreement on 1990 quarter one settlements. It is clear that sellers are resigned to losing ground on last year's figures of DM1.00-1.20/kg. Numbers are generally being posted in the range DM0.90-0.95/kg. The continued dearth of export opportunities is one major factor behind the sliding phthalic anhydride contracts. This is especially true in relation to China's disappearance from the market. In the first three quarters of 1988 China imported some 100,000 ton of product, while in the same period in 1989 the import figure slumped to just 10,000 ton. With demand for phthalic anhydride unlikely to pick up in the short term, lower prices are likely to remain. Another effect the lack of Far Eastern demand has been the deluge of cheaper deep sea material into the US and Europe markets.

MARKET INFORMATION

Solvents Up

ces of most solvents rose mar- y in the wake of rumours that L was contemplating a plant lown. Resorcinol declined sharply by Rs. 20 and ready material was available at Rs. 190 per kg. Trading was moderate and dye intermediates ruled steady.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on February 13, 1990)

TRIAL CHEMICALS	Per Kg.
nium sulphate	2.50
nium phosphate (Mono)	14.50
nium phosphate (Di)	14.50
nium carbonate (Di)	17.00
nium bicarbonate	6.00
nium chloride	3.25
nium nitrate	6.00
c white powder	25.00
mide (Resale)	71.00
carbonate	13.00
ing powder (33% Cl)	5.00
Borax (Granular)	17.50
Borax (Powder)	22.00
Boric acid (Tech)	26.00
Bisphenol-A	75.00
Butyl carbitol	110.00
Caustic soda (Flakes)	10.90
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	6.00
Calcium carbonate (Activated)	5.75
Cobalt oxide	300.00
Cresylic acid	62.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	44.00
Copper sulphate	26.00
Chromic acid	63.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	116.00
Hydro	35+ST

Hyflosupercell	21.75
Hexamine (Resale)	34.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	39.00
Lithopone	19.00
Magnesium chloride (Crystal)	2.00
Menthol crystal (Flakes)	355+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	30.00
Magnesium carbonate (Indian)	26.00
Maleic Anhydride (Resale)	42.00
Mercury (34.5 Kgs)	11,500.00
Nickel chloride	110.00
Oxalic acid (Resale)	17.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	26.00
Potassium carbonate (Imported)	36.00
Potassium bichromate	33.00
Potassium phosphate (Mono)	34.00
Potassium phosphate (Di)	25.00
Polyvinyl alcohol (No. 117)	115.00
Polyvinyl alcohol (No. 173)	117.00
Polyvinyl alcohol (No. 208)	120.00
Paraformaldehyde (Resale)	25.00
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	49.00
Paraffin wax	19+ST
Rangolite (German)	96+ST
Rangolite (Czech.)	70.00
Sodium sulphate (Fine)	3.75
Sodium sulphate (Coarse)	3.60
Sodium sulphide 50-52% (Flakes)	11.50
Sodium sulphide 58-60% (Flakes) (TCL)	25.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	730.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	4.90
Soda Ash (Birla)	4.30
Soda Ash (Imp.)	4.50
Sodium bicarbonate	6.00
Sodium bisulphite	8.00
Sodium silicate	5.50
Sodium acetate	7.20
Sodium alginate	420.00
Titanium Dioxide (Anatase)	75.00
Titanium Dioxide (Rutile – RCR_2)	118+ST
Tartaric acid	109.00
Trisodium phosphate	12.00
Thiourea	84.00
Urea (Tech.)	3.00
Vacuum salt	1.00
Zinc Dust	52.00
Zinc Oxide	57.00
Zinc chloride powder (Tech.)	20.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.00
Acetic Anhydride (Resale)	35.50
Acetone (Resale)	18.00
Adipic Acid	70.00
Aceto Acetanilide	55.00
Aniline Oil	50.00
Benzoate Plasticiser	62.00
Butyl acrylate	84+ST
Butyl stearate	38.00
Butanol	
Benzyl Alcohol	
Benzyl Chloride	
Benzo trichloride	
Benzoyl chloride	
Bromine Liquid	
Chloroform	
Carbon Tetrachloride	
Cellosolve	
Cyclohexanone	
Cyclohexanol	
Diacetone (Resale)	
Diethyl Oxalate	
Diethyl glycol (DEG)	
Dioctyl Phthalate	
Diallyl Phthalate	
Dimethyl Phthalate	
Dioctyl Adipate	
Dibutyl Adipate	
Dipentene	
Dimethylamine 40%	
Dimethylamine 50%	
Ethyl Acetate	
Ethyl Acrylate	
Ethylene Dichloride	
Ethylene Glycol	
Formic Acid (Imp.)	
Formaldehyde (Resale)	
Glycerine (CP)	
Glycerine (IW)	
Hydrogen Peroxide 50% (Resale)	
Isopropyl Alcohol	
Isobutyl Alcohol (Resale)	
Monoethanolamine (Resale)	
Melamine	
Methyl Ethyl Ketone	
Methyl Isobutyl Ketone	
Methyl Acrylate	
Methylene Dichloride (Resale)	

Meta Cresol	45.00
Nitrobenzene	19.00
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	35.00
Propylene Glycol	50.00
Polyethylene Glycol (No.200)	58.00
Polyethylene Glycol (No.400)	60.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	80.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	43+ST
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	28.00
Triethanolamine (Resale)	88.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	50.00

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	12.50
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	11.50
Xylene	21.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	170.00
Aceto Acetic Ester (Methyl)	72.00
Ammonium Molybdate	210.00
Anthraquinone	145.00
Anthranilic Acid	78.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	350.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	95.00
Bromamine Acid	550.00
BON Acid	130+Ex+Ta
Chicago Acid (Atul)	355.00
Coach Acid	52.00
C. Acid (Imp.)	210.00
Cyanuric Chloride	150.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	75.00
Diethyl Aniline	160.00
Diamino stilbene disulphonic acid	168.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	205.00
H. Acid (Atul)	115.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	350.00
J. Acid Urea	410.00
K. Acid	125.00
MPDS (German)	185.00
Meta Ureido Aniline	230.0
MPD (Local)	205.0
MPD (Japan)	240.0
Naphthenic Acid	25.0
N-Methyl J. Acid	580.0
N-Methyl Aniline	125.0
Naphthalene (Refined)	23.0
Ortho Anisidine (OA) (Imp.)	108.0
Ortho Dichloro Benzene (ODCB)	20.0
OT Base	130.0
Para Dichloro Benzene (PDCB)	32.0
Para Anisidine (PA local)	160.0
PNA	120.0
Para Cresidine (Imp.)	410.00
Para Amino Azo Benzene (India)	150.00
PNCB	62.00
Para Amino Acetanilide	190.00
1-Phenyl 3-Methyl 5-Pyrazolone	140.00
Phenyl J. Acid	340.00
Para Amino Benzoic Acid	165.00
PT Base	140.00
Rhoduline Acid	550.00
Resist Salt 80%	28.00
Resorcinol	190.00
Sodium Naphthionate	67.00
5-Sulpho-Anthranilic Acid	75.00
Sulphanilic Acid	33.00
Sulpho Tobias Acid	160.00
Trichloro Benzene (TCB)	24.00
Tobias Acid	166.00
Metanilic Acid	43.00
MTD	120.00

Bombay Dyes Market

(Prices as on February 13, 1990)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50
Red 2B	422.4
Red FB	425.8
Red Violet FBL	622.0
Orange 3R	254.2
Violet 3R	370.5
Violet RL	355.7
Violet 6R	638.2
Scarlet RR	283.5
Rubine 3B	289.1
Rubine CB	449.5
Blue GL	419.0
Blue BGF	805.8
Navy Blue RE	359.9
Brown 3REL	272.8
Black GEL	420.1
Dark Brown 3B	411.1

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60

BASE COLOURS	Per Kg
Fast Yellow GC	77.7
Fast Orange GC	128.4
Fast Scarlet R	198.0
Fast Scarlet RC	128.4
Fast Scarlet RCR	105.0
Fast Scarlet G	115.7
Fast Scarlet GN	92.9
Fast Scarlet GG	77.7
Fast Scarlet GGS	73.9
Fast Red B	233.5
Fast Red RC	115.7
Fast Red R Flakes	158.8
Fast Red TR	181.6
Fast Red TR Oil	223.3
Fast Red RL	251.2
Fast Red KB Oil	251.2
Fast Bordeaux GP	236.0
Fast Garnet GBC	103.0
Fast Violet B	548.8
Fast Blue BB	566.5

NAPHTHOL COLOURS	Per Kg
ASG	301.8
AS	205.6
ASSW	379.1
ASBS	253.7
ASBO	266.4
ASD	209.4
ASOL	243

R	369.00
H	336.05
:	236.00
L	249.95
B	2002.35
T	2459.45
VG	143.00
G	538.65
R	652.60

CION COLOURS	Per Kg.
den Yellow HR	207.95
Yellow H4G	145.65
ra Yellow H-8GP	168.55
Yellow HE6G	214.75
ow G-E4R	276.05
Yellow H7G	332.30
ow M4R	275.45
ow MGR	387.65
Yellow M4G	201.15
Yellow M8G	366.10
ow M3R	244.70
Orange H2R	303.80
Red H7B	157.95
Orange M2R	313.15
Red H8B	213.55
Scarlet H RN	245.05
ra Red H-3BP	179.80
Red H-F3B	243.45
Magenta HB	182.00
Red M 5B	160.05
Red M 8B	218.35
Pink MB	137.10
Magenta MB	163.65
Purple H-3R	219.55
Purple H-7R	175.40
Blue H 3R	333.75
Blue H-GR	406.40
Blue H5G	207.95
H 5RX	286.20
Blue H 7G	213.95
Blue H 7RX	358.15
quoise HA	265.05
ra Blue H-3RP	595.30
ra Turquoise H 2G P	181.50
Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: FEB. 9, (NNS) Mercury registered a sharp rise of Rs. 400 at Rs. 11,200 per flask in the Delhi chemicals market during last week, due to negligible stock position as well as higher advices from Bombay. In Bombay mercury prices were quoted at Rs. 11,000 per flask. In view of increased stocking monopoly alongwith absence of import from France, tartaric acid France spurted sharply by Rs. 400 at Rs. 15,400. In the second week of January it was quoted at Rs. 13,600. Trishul marka desi tartaric acid registered a gain of Rs. 125 at Rs. 4,575 per 15 kg due to poor availability. Swastik brand tartaric acid was quoted at Rs. 200 per kg. Seasonal demand was good in tartaric acid.

Tartaric acid (Chinese hardened from Rs. 2,080 to Rs. 2,150 per 50 kg in the beginning of the week due to shortage of stock and bullish advices from Bombay but at the week end prices reverted and finally closed at Rs. 2,125 owing to increased offerings, still showing a rise of Rs. 45 over its previous week level. Citric acid Bombay Dyeing ruled quiet at Rs. 2,450 over the week.

Sufolite dropped sharply by Rs. 4 at Rs. 68 per kg in view of comfortable stock position as well as better supply. Chatkolite remained static at Rs. 57 per kg. Arrivals and offtake were poor in rangolite and prices remained quiet at Rs. 90 per kg. Titanium dioxide anatase suffered a steep fall of Rs. 4 at Rs. 78 per kg for want of support from plastic and paint units alongwith increased offerings by stockists. Titanium dioxide K-brand and RC-822 also drifted lower by Re. 1 each at Rs. 74 and Rs. 94. Sodium sulphate DCM red marka suffered a set back of Rs. 100 at Rs. 3,600 per tonne in the absence of enquiries. Trisodium phosphate also slipped by Rs. 25 at Rs. 600 per 50 kg in the absence of demand. Naphthalene balls moved down by Rs. 50 at Rs. 1,400 due to comfortable supply.

As a result of increased offerings from Sambhal, Muradabad, Rampur, Amroha and Chandausi alongwith poor offtake, menthol flake suffered a fall of Rs. 20 at Rs. 315/kg. Menthol medium and bold also slipped by Rs. 5/10 at Rs. 355 and Rs. 375. Mentha oil tumbled down by Rs. 10 at Rs. 230/250 and DMO lost Rs. 5 at Rs. 120 in the hope of early commencement of new crop by May. Soda bicarb Tata declined by Rs. 10 at Rs. 290 due to improved supply.

(DELHI MARKET RATES AS ON FEBRUARY 9, 1990)

Ammonia Bicarb (Per 25 Kg.)	140.00
Mercury (Per flask)	11,200.00
Soda ash (Per bag)	342/355.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	525.00
Citric acid (Per 50 Kg.)	2,125/2,450.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCI (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	290/305.00
Sodium Hydrosulphite (Per Kg.)	34.00/36.50
Rangolite (Per Kg.)	90.00
Tartaric acid (Imp) (50 Kg.)	15,400.00
Sufolite (per Kg.)	68.00
Chatkolite (per Kg.)	57.00
DMO	120.00
Boric acid Technical (Per 50 Kg.)	1,350.00
Paraffin Wax (Per 50 Kg.)	850.00
Tartaric Acid (Indian Per 15 Kg.)	4,575.00
Borax Granular (Per 50 Kg.)	835.00
Borax Crystal (Per 50 Kg.)	835.00
Sodium Nitrite (Per 50 Kg.)	1,000/1,075.00
Sodium Nitrate (Per 50 Kg.)	450.00
Camphor Thai (Per Kg.)	104.00
Camphor Powder (Per Kg.)	95.00
Menthol Bold (Per Kg.)	375.00
Menthol Medium (Per Kg.)	355.00
Menthol Flake (Per Kg.)	315
Menthol Oil (Per Kg.)	230/250
Glycerine (Per Kg.)	55/58
Sodium Silicate (Per quintal)	275/350
Hexamine (Per Kg.)	34
Acetic Acid Glacial (Per Kg.)	15
Copper Sulphate (Per quintal)	2,400/2,
Formic Acid (Per Kg.)	23
Formaldehyde (Per Kg.)	8
Hydrogen Peroxide (Per Kg.)	26.50/27
Calcium Carbonate (Per Tonne)	2,500/4,
Acid Slurry Soft (Per Kg.)	30
Acid Slurry Hard (Per Kg.)	38
Phosphoric Acid (Per 50 Kg.)	1,050
Potassium Nitrate (Per quintal)	900/1,200
Potassium Permanganate (Per 50 Kg.)	2,800/3,200
Sodium Bichromate (Per 50 Kg.)	1,575/1,600
Trisodium Phosphate (50 Kg.)	600
Titanium Dioxide Anatase (Per Kg.)	78
Titanium Dioxide RC-822 (Per Kg.)	94
Titanium Dioxide K-Brand (Per Kg.)	74
Titanium Dioxide RCR-2 (Per Kg.)	[illegible]
Zinc Oxide (Per metric tonne)	42,000/48,000
Phenol Carbolic Acid (Per Kg.)	37
Carbon Tetrachloride (Per Kg.)	24
Chloroform (Per Kg.)	29
Sodium Sulphate (Per metric tonne)	3,400/3,600
Naphthalene Balls (Per 50 Kg.)	1,400

DYES & COLOURS	(Per
Naphthol AS	175/20
Naphthol ASG	180/29
Naphthol ASBS	210/24
Naphthol ASTR	275/36
Naphthol ASOL	210/23
Naphthol ASBO	195/26

DIRECT DYES	(Per
Black E. Conc.	120/17
Diazo Black B.T.	105/14
Green B	90/14
Blue 2-B	60/10
Blue 2-B 225% (JNR)	12
Sky Blue FB	160/23
Basic Auramine	55/11
Basic Rhodamine	300/42
Basic Methylene Blue	100/16
Basic Violet	165/21
Basic Malachite Green	17
Acid Orange	75/11
Congo Red H/C	75/12

Madras Market

Moderate to dull activity prevailed. ere has been no change in the ces and the prices maintained at l levels. The recently concluded ernational Leather Fair 1990 has ought in fresh hopes for the leather emicals producers. The fair has been a great success on all counts. The outlook of the industry is good with exports expected to touch Rs. 2,000 crore mark this year and the Government is keen on reaching the Rs. 10,000 crore mark before the turn of the century.

(MADRAS MARKET RATES AS ON FEBRUARY 11, 1990)

tic Acid Glacial (per kg)	15.00
minium Sulphate Iron free per MT)	4,000.00
monium Bicarbonate per 25 kgs)	150.00
monium Chloride (per MT)	3,000.00
d Slurry (per kg)	31.00
ium Carbonate (per kg)	9.00
ium Chloride (per kg)	8.00
c Acid Technical (per kg)	24.00
aching Powder (per 50 kgs)	220.00
ax (per 50 kgs)	700.00
stic Soda Flakes – Mettur hemicals (per MT)	10,800.00
stic Soda Flakes – Andhra ugars (per MT)	10,800.00
cium Chloride 70% Solid per MT)	3,000.00
cium Chloride Anhydrous per MT)	5,500.00
cium Carbonate (Activated) per MT)	5,900.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	130.00
Pure Para Cresol 96% (per kg)	85.00
Meta Para Cresol 42% (per kg)	50.00
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	8.50
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	49.00
Hydrosulphite of Soda (TCPL) (per kg)	37.50
Hydrosulphite of Soda (IDI) (per kg)	41.00
Hydrosulphite of Soda (BASF) (per kg)	41.00
Hexamine (per kg)	30.00
Hyflosupercell (per kg)	20.00
Hydrogen Peroxide (per kg)	31.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	37.00
Magnesium Carbonate (per kg)	18.00
Magnesium Chloride (per kg)	3.50
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	375.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	17.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	25.00
Polyvinyl Alcohol Powder (per kg)	125.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	355.00
Soda Ash (TATA) (per 75 kgs)	355.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	14.50
Sodium Bisulphite (per kg)	7.00
Sodium Alginate (per kg)	230.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	3.75
Titanium Dioxide (Anatase) (per kg)	75.00
Titanium Dioxide (Rutile) (per kg)	95.00
Trisodium Phosphate (per kg)	12.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	50.00
Zinc Chloride Powder (per kg)	12.50
Zinc Sulphate (per kg)	8.00

SOLVENTS

Acetone -- HOCL (per kg)	20.00
Butanol (per kg)	34.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	14.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	20.00
Chloroform (per kg)	29.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	36.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	45.00
Di-N-butyl Phthalate (per kg)	45.00
Ethyl Acetate (per kg)	22.00
Isopropyl Alcohol (per kg)	28.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	20.00
Methyl Ethyl Ketone (per kg)	34.00
Methyl Isobutyl Ketone (per kg)	42.00
Phenol (per kg)	38.00
Sorbitol (per kg)	16.00
Triethanolamine (per kg)	95.00
Trichloroethylene (per kg)	26.00
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	16.00
Xylene (per lit)	22.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Appr sailing (5)
18/2	Medipas Bay (Cyo)	L. Triest/	Jeddah; Barcelona; Marseilles; Genoa; Leghorn; La Spezia; Naples with TP Trieste; Venice; Ravennah; Bari; Koper; Rjeka; Las Palmas; Santacruz; De Teneriffe; Malta; Limmassol; Alexandria; Casablanca; Tunis; Algiers; Lattakia; Tripoli; Benghazi; Oran; Point E Pitre; Port De France. (Carting at M-171/173 Cotton Depot).	22/2
		Samrat/ Hindustan/	Barcelona; Marseilles; La Spezia; Livorno; (Leghorn); Genoa; Naples; and other Italian ports and FCL only Beirut; Alexandria; Valletta; Lattakia; Mersin. (Carting at M.O.D. No. 1 for both).	
		Merzario	Genoa; Leghorn; La Spezia; Naples; Salerno; Marseilles; Barcelona. (Carting at M.O.D. No. 2).	
18/2	Alkantara (Egy)	M.C.S.	P. Said; P. Suez; Alexandria. (Carting at 12-VD).	24/
18/2	Eagle Star	F.F.C. Co.	Jeddah; P. Sudan; Hodeidah. (Carting at Timber Pond No. 1).	22/
22/2	CMB Effort	C.M.B.	Djibouti; Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmigham; Avonmouth, Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Carting at Kalamboli).	24/
21/2	Moji	Kanika	Antwerp; Rotterdam; Hamburg; Le Havre; Genoa; Gothenburg; Stockholm; Copenhagen; Oslo; Helsinki; London; Felixstowe; Tilbury. (Carting at T.P. No. 3).	27/
23/2	Orient Express (Pan)(V-110)	Transworld/	Hodeidah; Djibouti; Port Sudan; Jeddah; Assab; Masawa; La Spezia; Naples; Malta; Beirut; Tartous; Mersin; Marseilles; Genoa; Valencia; Fos; Leghorn; Tilbury; London; Liverpool; Avonmouth; Birmingham; Manchester; Leeds; Dublin; Belfast; Antwerp; Hamburg; Bremen; Rotterdam; Le Havre; Aarhus; Gothenburg; Helsinburg. (Carting at CFS Cotton Avenue).	26/
		Seaspeed	Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Scandinavian ports. (Carting at Hay Bunder No. 5).	
23/2	K. Paustovsky (Rus) (Nhava Sheva)	Transocean	Odessa; Illyichevsk; Havana; (Cuba); Genoa; Trieste; Piraeus; Marseilles, Barcelona; Varna; Bourgas. (Carting at Kalamboli)	27/
26/2	Tibor Szamuely (Rus) (V-106 W/B)	Transocean	Odessa; Izmail; Reni (USSR); Russe; Bulgaria; Budapest (Hungary); Linz; Vienna (Austria); Bratislava (Czechoslovakia); Deggendorff Regenburg (West Germany) (All ports on River Danube). (Carting at N/O-PD & G-PD).	27/
27/2	Robert E Lee	M.S.P.L.	Aqaba; Assab; P. Suez; (Alexandria). Carting at P/Q-PD).	27/
18/2	Together (V-2)	Sitara	Karachi (Afghanistan).	25/
18/2	Medipas Bay	L. Triest	Colombo. (Carting at M-171/173 Cotton Depot).	22/
18/2	Eagle Star	F.F.C. Co.	Colombo; Ranghoon. (Carting at Timber Pond No. 1).	22/
20/2	Hafez	J.M. Baxi	Chittagong.	23/
21/2	Moji	Silvership	Chittagong. (Carting at Timber Pond No. 3).	27/
23/2	K. Paustovsky	Transocean	Afghanistan. (Carting at Kalamboli)	22/
18/2	Vega (V-10A/B) (Sing)	O.S.A.	P. Kelang; Singapore; Kaohsiunj; Hongkong; Bangkok; Kobe; Yokohama; Nagoya; Moji; Osaka; Busan; Tokyo; Simizu; Keelung; Tsingtao; Quindao; Xiangang; Shanghai. (Carting at M-178/180 C.D. for O.S.A.).	25/
		M.S.P.L.	Singapore; Bangkok; P. Kelang; Penang; Jakarta; Manila. (Carting at Hay Bunder No. 4).	
18/2	Eagle Star (V-28)(Cyp)	F.F.C. Co.	Penang; P. Kelang; Singapore; Bangkok; Jakarta; (T. Priok); Hongkong; Manila; Busan; Keelung; Kaohsiung; Kobe; Yokohama; Nagoya; Osaka; Tokyo; Tsingtao; Dairen; Quangzbou; Whampoa; Shanghai; Hsingkang. (Carting at Timber Pond No. 1).	22/

	(2)	(3)	(4)	(5)
	Moji (V-17) (Dut)	Samrat/	Singapore (Direct); Penang; Jakarta; Surabaya; Belawan; P. Kelang; Bangkok; Manila; Hongkong; Kaohsung; Keelung; Taichung; Busan; Yokohama; Nagoya; Kobe; Osaka; Tokyo. (Carting at Mallet Bunder).	27/2
		Trident/	Busan; Hongkong; Keelung; Kobe; Nagoya; Yokohama; Penang; P. Kelang; Bangkok; Kaohsiung; Singapore. (Ctg. at T.P. No. 4).	
		U.L.A.	Singapore; Penang; P. Kelang; Keelung; Kaohsiung; Bangkok; Busan; Jakarta; Hongkong; Japan and Chinese ports. (Carting at M-171/173 Cotton Depot).	
		E.S.P.L./	Singapore; Hongkong; Bangkok; Jakarta; Kaohsiung; Keelung; Penang; P. Kelang; Kota Kinabulu; Kulaubelati; Bintulu; Kuching; Labuan; Vietnam (P.R.C.). (Carting at Mallet Bunder).	
		I.M.E.	Singapore; Bangkok; Hongkong; Keelung; Busan; Kobe; Yokohama; Nagoya. (Carting at Wadi Bunder No. 3).	
		M.C.S./	Singapore; Hongkong; Keelung; Kaohsiung; Jakarta; Surabaya; Bangkok; Penang; P. Kelang. (Carting at H.B. No. 4).	
		Kanika/	Bangkok; P. Kelang; Djakarta; Keelung; Busan; Hongkong. (Carting at T.P. No. 3).	
		Silver Ship	Singapore; Far East & Japan ports. (Carting at T.P. No. 3).	
2	Mandama	Killick/P&O/ I.M.E.	Singapore. (Carting at Timber Pond No. 4 for P&O) (Carting at Wadi Bunder No. 3 for I.M.E.) (Ctg. at Hay Bunder No. 5 for Killick).	24/2
2	Orient Express (V-110)	Transworld/	P. Kelang; Penang; Keelung; Kaohsiung; Busan; Bangkok; Kobe; Manila; Djakarta. (Carting at CFS Cotton Avenue).	26/2
		N.L.S.	Far East; Japan and Chinese ports. (Carting at T.P. No. 4).	
2	Robert E Lee	M.S.P.L.	Singapore. (Carting at P/Q-PD)	27/2
2	Eagle Star	F.F.C. Co.	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Carting at T.P. No. 1).	22/2
2	Vega	O.S.A.	Sydney; Melbourne; Adelaide; Brisbane; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting at M-178/180 C.D.).	25/2
2	Moji (V-17)	Samrat/	Brisbane; Sydney; Melbourne; Adelaide; Fremantle; Burnie. (Carting at M.B.	27/2
		Trident/	Brisbane; Sydney; Melbourne; Adelaide; Fremantle; Burnie; Auckland; Wellington; Lyttelton. (Carting at T.P. No. 4).	
		Arebee/	Sydney; Melbourne; Adelaide; Brisbane. (Carting at M-Jetha Cotton Depot).	
		Transworld/	Sydney; Melbourne; Adelaide; Fremantle; Burnie; Brisbane. (Carting at CFS Cotton Avenue).	
		Kanika/	Brisbane; Sydney; Melbourne; New Castle; Adelaide; Fremantle; Auckland; Wellington; Lyttleton. (Carting at Timber Pond No. 3).	
		Silver Ship/	Sydney; Melbourne; Brisbane; Adelaide; Fremantle; Auckland; Wellington; Lyttleton; P. Chalmers. (Carting at T.P. No. 3).	
/2	Mandama (V-0568) (Sing)	Killick/P&O/	Melbourne; Sydney; Brisbane; Adelaide; Fremantle; P. Hobart; Devon P; Launcheston; Burnie; P. Chalmers; Lyttelton; Christchurch; Dunedin; New Plymouth; Auckland; Wellington; Napier. Also Western Samoa; Papua; New Guinea; Solomon Island; American Samoa; Tonga; New Calidonia; Rabaul; P. Villa. (Carting at Hay Bunder No. 5 for Killick) (Carting at T.P. No. 4 for P&O).	24/2
		I.M.E.	Sydney; Melbourne; Adelaide; Fremantle; Brisbane; Auckland; Wellington; Lyttelton. (Carting at Wadi Bunder No. 3).	
/2	Mun Su (Kor)	Link Ship	Sharjah (Reefer only)	23/2
/2	Eagle Star (V-28)	F.F.C. Co.	Dubai; Sharjah; Abu Dhabi; Doha; Muscat; Dammam; Riyadh; Bahrain; Kuwait. (Carting at Timber Pond No. 1).	22/2
/2	Together (UAE)	Sitara	Dubai.	25/2
/2	Al Zahraa (Iraq)	Al Rafidain	Umm Qaser.	26/2
/2	Hafez (Iran)	J.M. Baxi	Bandar Abbas	23/2
/2	Orient Express (V-110)(Pan)	Transworld/	Sharjah; Dubai; Abu Dhabi; Ajman; Doha; Kuwait; Dammam; Baghdad/Basrah; Syria and inland destinations in Gulf. (Carting at CFS Cotton Avenue).	26/2
		Sai Ship	Dubai; Muscat; Sharjah; Abu Dhabi. (Crtg. at Wadi Bunder No. 3).	
)/2	Banglar Moni (Voy-7).	Sai Ship	Mombasa; Dar Es Salaam. (Carting at Wadi Bunder No. 3).	25/2
)/2	Vishva Nandini (Ind)	S.C.I.	P. Louis; Mombasa; Dar Es Salaam; Beira (Direct) and inland Destinations in E. Africa. (Carting at T.P. No. 1).	28/2

(1)	(2)	(3)	(4)	(5)
20/2	Menkar (V-02) (Cyp)	Arebee/	Dar Es Salaam & Mombasa (Direct); Kampala; Jinja; Toronto; Lugazi; Entebee (Uganda); Kigali; (Rwanda); Kitwe; Lusaka; Ndola (Zambia); Lilongwe; Blantyre (Malawi); Maputo; Zanzibar. (Carting at M.J.C.D.)	22
		P&O	Mombasa; Dar Es Salaam (Direct); Beira; Mahe and inland destinations in East Africa. (Carting at Timber Pond No. 4).	
18/2	Vega (V-10A/B)	O.S.A.	New York; Baltimore; Philadelphia; Houston; Boston; Chicago; Dallas; Atlanta; Savannah; Norfolk; Charleston; Los Angeles; Sanfrancisco; Oakland; Seattle; Vancouver; Toronto; Montreal; Portland; Tacoma & S. American & West Indies ports. (Carting at M-178/180 Cotton Depot).	25/
18/2	Medipas Bay	Samrat/ Hindustan/ L. Triest	Boston; NewYork; Baltimore; Norfolk; Charleston; P. Mouth; P. Lauderdale; Miami; New Orleans; Savannah; Jacksonville; P. Everglades; Philadelphia; Halifax; Montreal; Toronto and S. American ports. (Carting at M-171/173 Cotton Depot for L. Triest) (Carting at M.O.D. No. 1 for Samrat and Hindustan).	22/
18/2	Eagle Star (V-28)	F.F.C. Co.	Los Angeles (Harbour); Longbeach; San Francisco; Oakland; Seattle; Vancouver (B.C.); Portland; New York; Boston; Norfolk; Baltimore; Cnarleston; Savannah; Miami; New Orleans; Houston; Montreal; Toronto; Fortworth; Chicago; Nashville; Atlanta; Philadelphia; Milwaukee; Kansas City; Phoenix; Guam; Dallas; Cleveland; St. Louis; Cincinnati; Denver; Louisville; Memphis; Wilminghton (B.C.); San Diego; Minneapolis; Indianapolis and Central American ports; Honolulu. (Carting at Timber Pond No. 1).	22/
21/2	Moji (Voy-17)	Samrat/	Longbeach; Oakland; Seattle; Los Angeles; Sanfrancisco; Philadelphia; Savannah; Charleston; Baltimore; Norfolk; New York; Boston; St. John; Vancouver; Montreal; Toronto; New Orleans; Houston. (Carting at M.B.).	27/
		U.L.A./	Los Angeles; San Francisco; Oakland; Seattle; Vancouver; Charleston; Houston; Norfolk; Baltimore; New York; Halifax; Montreal; Toronto; S. Americn & West Indies ports. (Carting at M-171/173 Cotton Depot).	
		E.S.P.L.	Longbeach; Charleston; New York; St. John; Norfolk; Oakland; Vancouver (B.C.); Seattle; Montreal; Baltimore; Boston; Chicago; Dallas; Houston; Longview; Los Angeles; New Orleans; Philadelphia; Portland; San Diego; Mexico City; San Francisco; Siouxfall; Sacramento; Stockton; Halifax; Toronto; Savannah; Tacoma; Miami; and all other destinations. Also Caribbean ports. (Carting at Mallet Bunder).	
		Trident/	S. American; Caribbean and Central American ports. (Carting at T.P. No. 4).	
		Arebee	S. American ports. (Carting st M-Jetha Cotton Depot).	
23/2	Orient Express (Voy-110)	Transworld	Los Angeles; Longbeach; San Francisco; Oakland; Seattle; Vancouver; New York; Boston; Toronto; Montreal; Philadelphia; Norfolk; Baltimore; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston. (Carting at CFS Cotton Avenue).	26/
22/2	CMB Effort	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans; Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli).	24/
22/2	Mandama	Killick	South American ports. (Carting at Hay Bunder No. 5).	24/
24/2	Hoegh Dene	Patvolk	Montreal and Toronto via Halifax; NewYork; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans and FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5).	28/
27/2	Robert E Lee (Ame)	M.S.P.L.	Philadelphia; Baltimore; Norfolk; New Orleans; Houston; Savannah; New York. (Carting at P/Q-PD).	27
18/2	Medipas Bay	L. Triest	With T.P. Lagos/Apapa; Abidjan; Dakar; Douala; Cotonou; Nouakchott; Libreville; Tema; Matadi; Conakry; Freetown. (Carting at 171/173 (Cotton Depot).	22
21/2	Moji	U.L.A./	Lagos/Apapa; Abidjan; Lome/Matadi. (Carting at M-171/173 Cotton Depot).	27
		Trident/	Tema/Lome; Lagos; Matadi; Lobito; Luanda; Freetown; Cotonou; Douala; P. Harcourt; Abidjan; Monrovia; Dakar. (Carting at T.P. No. 4).	

(2)	(3)	(4)	(5)
CMB Effort	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at Kalamboli).	24/2
Orient Express (V-110)	Transworld	Monrovia; Lome; Lagos; Douala; Tema; Takoradi; Abidjan; San Pedro. (Carting at CFS Cotton Avenue).	26/2

VESSELS DUE FOR IMPORT DISCHARGE

Date	Seamer's Name	Agents	From
	CMB Effort (Nhave Sheva)	C.M.B.	UK Cont./US Med./E. Africa
	Dorothee (V-7)	Merzario/Samrat	U.K. Cont.
	Hoegh Dene	Patvolk	U.S.A.
	Ind. Renown	I.S.S. Co.	U.K. Cont.
	Kapitan Kud	Transocean	U.K. Cont.
	Link Target	I.S.S. Co.	U.K. Cont.
	Mandama (V-0568)	Killick/P&O/I.M.E.	Australia/New Zealand & Gulf
	Moji (V-17)	Samrat/Triedent/ULA ESPL/IME	Far East & U.S.A.
	Orient Express (V-110)	Transworld	Gulf
	Rumija	S.C.I.	U.K. Cont.
	Robert E Lee	M.S.P.L.	U.S.A.
	Tibor Szamuely (V-106)	Transocean	Russia & E. Europe
	Vishva Sidhhi	S.C.I.	Constanza
	Volosko	Oceanic	Adriatic

Materials Imported

MATERIALS IMPORTED BOMBAY (From 21.12.89 to 27.12.89) 'ontinued from previous issue

CHIFF BASE: From Italy: Usan s P. Ltd., 2,000 Kgs., Rs. 5,59,486.

ELENIUM METAL POWDER %: From Japan: J.G. Glass Ltd., 300 ., Rs. 73,941.

ODIUM FORMALDEHYDE PHOXYLATE: From China: ta Overseas Corpn., 26.7 MTs., 4,52,677; Harkab Holding P. Ltd., MTs., Rs. 2,50,408; Prakash ander Factory, 16 MTs., 2,84,830; From Czechoslovakia: huram & Co., 12 MTs., 1,99,980; From China: Veer Prabhu ort House, 800 Kgs., Rs. 1,42,415.

ODIUM HYDRIDE 60%: From A: Dr. Reddy's Labs Ltd., 5 MTs., 7,81,826.

ITANIUM DIOXIDE: From ada: Movilex Polymers P. Ltd., 477 MTs., Rs. 6,66,181; From na: Bhuta Overseas Corpn., 7.5 's., Rs. 4,45,047; Kalpesh Enterpri- 13,125 Kgs., Rs. 3,67,164; From y: Asian Paints India Ltd., 124 MTs., 46,19,257; From USA: Asian Paints ia Ltd., 2,99,583 Kgs., 1,81,89,573; Goodlass Nerolac nts Ltd., 36,288 Kgs., Rs. 16,61,117; dustan Exports Enterprise, 18.144 's., Rs. 8,66,553; M.P. Exports pn. Ltd., 54.43 MTs., Rs. 28,83,794; ni Chemicals, 4,245 Kgs., 1,74,602.

TOLUENE DI ISOCYANATE: m USA: Cheminova Inds. P. Ltd., 19 's., Rs. 6,95,798.

TRIETHYL ALUMINIUM: From G: PIL Ltd., 4,800 Kgs., 5,96,124.

TRIETHYL PHOSPHITE MIN. %: From USA: Jyoti Inds., 986.575 s., Rs. 55,335.

TRIETHYLENE GLYCOL: From Taiwan: J.K. Synthetics Ltd., 3,150 Kgs., Rs. 1,28,534.

TRICHLORO ETHYLENE: From Japan: Lakshon Electronics P. Ltd., 16.5 MTs., Rs. 1,54,961.

3,4,5 TRIMETHOXY BENZALDEHYDE: From China: New Generic Drug House Ltd., 2,000 Kgs., Rs. 7,62,936.

TRIMETHYLOL PROPANE: From Sweden: Devidayal Electronics & Wires, 3,000 Kgs., Rs. 10,406.

PLASTIC MATERIALS IMPORTED BOMBAY (From 21.12.89 to 27.12.89)

HDPE: From Brazil: Steel Strips & Tubes Ltd., 500 MTs., Rs. 6,85,795; From Czechoslovakia: Associated Plastic Inds., 12.5 MTs., Rs. 1,10,625; From Saudi Arabia: Beevees Assn., 16.5 MTs., Rs. 19,210; B.M.P. Enterprises, 16 MTs., Rs. 2,09,393; The Bombay Oil Inds. Ltd., 17,150 Kgs., Rs. 2,09,869; Bright Brothers Ltd., 51.45 MTs., Rs. 6,19,326; Diamond Polyprints, 17.15 MTs., Rs. 2,23,888; G.N. Plastopak, 17,150 Kgs., Rs. 2,23,888; Pai Real Estate, 34.3 MTs., Rs. 4,13,908; Polyset Products P. Ltd., 34.3 MTs., Rs. 4,16,823; Prem Exports, 17,150 Kgs., Rs. 2,24,443; Shalimar Pack, 49.5 MTs., Rs. 6,42,011; Texoplast, 51.45 MTs., Rs. 6,62,941; Universal Lugg. Mfg. Co. Ltd., 308.7 MTs., Rs. 35,06,612; Veeplast, 48.6 MTs., Rs. 8,33,648; VIP Inds. Ltd., 394.45 MTs., Rs. 44,80,666; From Singapore: Ashok Plastic Inds., 34 MTs., Rs. 4,45,248; Sephaire Chemicals, 51 MTs., Rs. 6,67,708; From USA: Bajaj Plastics Ltd., 121.225 MTs., Rs. 14,85,776; Beri Plast P. Ltd., 85 MTs., Rs. 8,81,024; Bhaskar Plastics P. Ltd., 51,000 Kgs., Rs. 6,84,777; Borana Plastics, 13,608 Kgs., Rs. 1,58,038;

HGF Laminates, 51 MTs., Rs. 6,97,779; From Yugoslavia: Balaji Enterprises, 45 MTs., Rs. 5,98,435; Columbia Leasing & Finance Ltd., 225 MTs., Rs. 28,96,094; Deluxe Plastics, 30 MTs., Rs. 4,00,036; Evergreen Plastic Corpn., 20,000 Kgs., Rs. 2,65,767; Hira Plastic Work, 20 MTs., Rs. 2,66,716; Monofil Plastics, 5 MTs., Rs. 6,65,241; Pan Asia Intl. P. Ltd., 105 MTs., Rs. 13,45,333; Polyset Plastics Ltd., 17.15 MTs., Rs. 2,08,412; Ravi International, 82 MTs., Rs. 10,88,413; Unisol India P. Ltd., 100 MTs., Rs. 13,30,500; Urvi Plastic Inds., 27 MTs., Rs. 3,59,163; Western Comm. Corpn., 50 MTs., Rs. 6,62,914.

LDPE: From Sweden: Universal Cables Ltd., 33 MTs., Rs. 8,27,309.

LLDPE: From Saudi Arabia: Everlast Pipes P. Ltd., 16.5 MTs., Rs. 1,82,283; Ganpati Fishing Lines P. Ltd., 33 MTs., Rs. 3,42,134; Interplast Inds., 74.25 MTs., Rs. 8,07,657; From Canada: K.N. Holdings & Finan. P. Ltd., 16 MTs., Rs. 22,291; From Netherlands: Multi-films Plastics P. Ltd., 1,500 Kgs., Rs. 1,98,363; Plastichemi Inds., 49.5 MTs., Rs. 5,28,715; Pradeep Indl. Packers P. Ltd., 16.5 MTs., Rs. 1,69,305; Siddarth Plastics, NA, Rs. 3,44,938.

POLYETHYLENE: From Yugoslavia: Surendra Intl., 50 MTs., Rs. 6,65,682.

POLYPROPYLENE: From Austria: Universal Polychem, 65.8 MTs., Rs. 7,25,129; From Belgium: K. Raheja Exports P. Ltd., 300 MTs., Rs. 4,58,898; Kamet Plastics P. Ltd., 15 MTs., Rs. 1,83,105; From Japan: M.P. United, 15 MTs., Rs. 4,33,403; From Spain: Bagadia Packaging P. Ltd., 49.5 MTs., Rs. 5,95,854; Ruparel Plastics, 48 MTs., Rs. 5,85,955; Universal Polychem, 81.975 MTs., Rs. 9,03,719; Vishal Plastomer P. Ltd., 33 MTs., Rs. 3,97,236; From USA: Asha Handicrafts, 34 MTs., Rs. 4,16,067; Columbia Leasing & Finan. Ltd., 148.5 MTs., Rs. 16,19,064; Pan Asia Intl. P. Ltd., 96 MTs., Rs. 11,95,356; From Yugosla Indexim P. Ltd., 15.5 M Rs. 2,03,615; Supreme Polyplast, MTs., Rs. 1,98,273.

POLYSTYRENE: From Ko Bharat Intl., 50 MTs., Rs. 6,99, Brindeo Sales P. Ltd., 12,000 K Rs. 3,00,014; Fibro Plast Corpn., MTs., Rs. 15,30,468; Godrej & Bo Mfg. Co. Ltd., 85,000 K Rs. 14,95,171; Lalit Impex, 150 M Rs. 17,95,425; Prakash Plastic Inds. MTs., Rs. 2,54,956; Shree Plastic ducts, NA, Rs. 1,39,696; 40 M Rs. 55,878.

PVC RESIN: From Argentina: Plastic Inds., 100 MTs., Rs. 11,89, Grover Overseas P. Ltd., 350 MTs. 74,35,850; From France: Cable Co of India Ltd., 48,750 Kgs., Rs. 6,03 From FRG: The National Leather C Mfg., 60 MTs., Rs. 13,71,129; R Pipes Ltd., 250 MTs., Rs. 2,98, Shiv Laminating & Coating P. 18.875 MTs., Rs. 3,30,608.

PVC RESIN: From Mexico: Inds., 49.5 MTs., Rs. 5,92,953; B. Sons, 49,950 Kgs., Rs. 6,04,564; O Cable Products, 99 M Rs. 11,80,615; Raj Pipes Ltd., 99 M Rs. 11,83,163; Sarin Pipes P. Ltd MTs., Rs. 11,82,116; Star Pla 49.95 MTs., Rs. 6,12,677; Tain Chemicals & Plastics, 66,600 Rs. 8,15,021; Tube Products, 99 M Rs. 11,80,815; From Saudi Arabia Acc. & Fillings, 149.015 M Rs. 15,66,381; From Yugosl Accurate Pipes & Plastic P. Ltd., 2 MTs., Rs. 36,11,613; Std. Bat Ltd., 60 MTs., Rs. 1,04,592; Supreme Inds. Ltd., 499.5 M Rs. 58,63,968.

PTFE RESIN: From Japan: Flu Inds., 1,000 Kgs., Rs. 1,90,734; M Associates, 500 Kgs., Rs. 1,00 Sanghvi Wire Products, 1,000 Rs. 2,00,059.

STYRENE MONOMER: From gapore: K.K. Research Centre, MTs., Rs. 2,38,967.

UG MATERIALS IMPORTED BOMBAY (From 21.12.89 to 27.12.89)

FURAZOLIDONE BP 80: From ina: Krishnalal Hiralal, 2,000 Kgs., 2,71,266; From Hong Kong: Tata ports Ltd., 1,000 Kgs., Rs. 1,37,837.

D-CALCIUM PANTOTHENATE P: From Japan: Dilipkumar & Co., 0 Kgs., Rs. 1,06,812.

CHLOROXAZONE: From Taiwan: nnor Ltd., 400 Kgs., Rs. 1,52,587.

L-LYSINE MONO HCl USP: From pan: N.R. Jet Pharm Ltd., 1,000 Kgs., s. 90,349.

D-PANTHENOL USP: From FRG: Merck (India) Ltd., 3,000 Kgs., s. 89,387.

PHENOBARBITONE IP: From SA: May & Baker India Ltd., 1,000 gs., Rs. 1,69,439.

POVIDONE IODINE USP: From SA: Wockhardt Ltd., 3 MTs., s. 6,62,008.

MATERIALS IMPORTED BOMBAY (From 29.12.89 to 30.12.89)

ACRYLAMIDE: From Japan: Bharesh Chemical Inds., 15 MTs., Rs. 3,82,412; Hico Products Ltd., 700 Kgs., Rs. 1,78,018; J.M. Chemical Inds., 3,750 Kgs., Rs. 95,604; Textile Aux. & Chem., 1,500 Kgs., Rs. 3,69,663.

ALDEHYDE C-9: From USA: Oriental Aromatics, 523.8 Kgs., Rs. 1,20,630.

ANTIMONY OXIDE: From USA: Formica India Division, NA, Rs.76,902.

ANTIMONY TRIOXIDE: From Belgium: Orkay Silk Mills Ltd., 3,000 Kgs., Rs. [illegible],31,993.

BISMETHYL SILYL UREA: From FRG: Max India Ltd., NA, Rs. 13,91,727.

N-BUTYL DIETHANOLAMINE: From UK: Controller of Stores, 50 Ltrs., Rs. 11,484.

PARA TERTIARY BUTYL PHENOL: From Japan: Indian Plastics Ltd., 4,000 Kgs., Rs. 88,381.

D-CAMPHOR SULPHONIC ACID: From France: Wockhardt Ltd., 6,000 Kgs., Rs. 12,23,727.

CAPROLACTAM: From USA: Garware Nylons Ltd., 125 MTs., Rs. 32,93,016; From Netherlands: Kanoria Products Ltd., 45 MTs., Rs. 12,72,710; Nirlon Syn, 819 MTs., Rs. 2,43,36,028.

CATECHOL: From UK: K.K. Poonja & Sons, 2,000 Kgs., Rs. 1,22,988.

2-CYANO PYRIDINE: From Japan: Chandak Labs Pvt. Ltd., 290 Kgs., Rs. 2,41,517.

CYANURIC CHLORIDE: From FRG: Jay Chemical Inds., 18,000 Kgs., Rs. 9,38,108; Siemens Ltd., 12 MTs., Rs. 6,38,981.

2,6 DIETHYLAMINE: From Switzerland: Searle India Ltd., 4,446 Kgs., Rs. 20,02,477.

DIMETHYL SULPHOXIDE: From USA: Suchem Labs, 6,500 Lbs., Rs. 88,380.

N-ETHYL ANILINE: From Japan: Jaysynth Dye Chem Ltd., 4,095 Kgs., Rs. 3,08,427.

ETHYL VANILLIN: From France: Hoechst India Ltd., NA, Rs. 2,64,121.

FURFURYL ALCOHOL: From Belgium: Ranbaxy Labs Ltd., 2,640 Kgs., Rs. 88,883.

D(-)ALPHA HYDROXY PHENYL GLYCINE BASE: From Singapore: Armour Chemicals Ltd., 1,500 Kgs., Rs. 6,44,427.

D(-)PARA HYDROXY PHENYL GLYCINE METHYL POT. DANE

SALT: From Singapore: Ranbaxy Labs Ltd., NA, Rs. 14,27,681.

HEXAMETHYL DISILAZANE: From FRG: Allana Pharmachem Ltd., 279 Kgs., Rs. 5,25,074.

8-HYDROXY QUINOLINE: From France: G. Amphray Labs, 4,250 Kgs., Rs. 8,64,661.

ISOBORNYL ACETATE: From GDR: Dujodwala Inds., 5,000 Kgs., Rs. 9,34,250.

ISOOCTYL THIOGLYCOLATE: From FRG: ALA Chemicals Ltd., 8,400 Kgs., Rs. 12,64,695.

ISOPHORONE: From Italy: Rainbow Ink & Varnish Mfg., 15.2 MTs., Rs. 3,16,469.

L-BASE MIN 99%: From China: Mehta Pharmaceuticals Inds., 500 Kgs., Rs. 4,12,583.

L-LYSINE HYDROCHLORIDE USP: From Japan: Biological E. Ltd., 300 Kgs., Rs. 2,61,425.

L-LYSINE MONO HYDRO CHLORIDE PHARMA GRADE: From Japan: Cyanamid India Ltd., 1,000 Kgs., Rs. 93,245.

LACTIC ACID: From Spain: Arun Corpn., 5,250 Kgs., Rs. 1,51,315.

LINALYL ACETATE: From France: Seth Bros Pvt. Ltd., NA, Rs. 34,390; Seth Bros. Pvt. Ltd., 200 Kgs., Rs. 34,390.

MAGNESIUM OXIDE LIGHT: From Japan: C.J. Chemicals, NA, Rs. 19,069.

METHYL METHACRYLATE MONOMER: From Sri Lanka: Mars Plastics & Polymers Ltd., 62 MTs., Rs. 10,08,879.

METHYL PARATHION TECH.: From FRG: Vimal Pesticide, 1,560 Kgs., Rs. 63,024.

1-METHYL 4-PIPERIDONE: From Belgium: Bayer India Ltd., 200 Kgs., Rs. 9,47,882.

METHYLENE DIBROMI DIBROMO METHANE: From U Pesticides India, 16,329 K Rs. 7,63,211.

5-NITRO 2-AMINO PHEN From Japan: BASF India Ltd., Kgs., Rs. 2,67,028.

PARA OCTYL PHENOL: F Japan: Indian Plastics Ltd., 500 K Rs. 1,14,723.

POLYVINYL PYRROLIDO From USA: Sarabhai Chemicals, Kgs., Rs. 1,09,287.

PROPIOPHENONE: From U Wockhardt Ltd., 1,600 K Rs. 9,10,996.

PROPYLENE GLYCOL USP: F Japan: Glaxo India Ltd., 16,170 K Rs. 3,53,651; From USA: The Gen Import Co., 5.59 MTs., Rs. 1,08,9

PROPYLENE OXIDE: From F BASF India Ltd., 4,800 K Rs. 22,468.

SILICON DIOXIDE: From Ja Teletube Electronics Ltd., 500 K Rs. 19,085.

SODIUM CHLORATE: From N erlands: Wimco Ltd., 60 M Rs. 5,75,744.

SODIUM STARCH GLYCOLA USP: From Hungary: FDC Ltd., 1, Kgs., Rs. 10,173.

SOYA LECITHIN: From USA: H dustan Antibiotics Ltd., 1,000 L Rs. 56,851.

TETRAHYDROFURAN: Fr FRG: Asia Trade Enterprises, 1, Kgs., Rs. 92,246; Prakash Pipes Inds., 14.196 MTs., Rs. 6,99,706.

TITANIUM DIOXIDE: From U Ballarpur Inds. Ltd., 34.144 M Rs. 17,29,042.

TITANIUM TETRACHLORI From France: Super Urecoat Inds. L 5,120 Kgs., Rs. 1,22,677.

TOLUENE DIISOCYANATE: Fr FRG: Converter Adhesives & Ch 600 Kgs., Rs. 2,39,054.

3,4,5 TRIMETHOXY BENZALDEHYDE: From France: Metox Chemicals Pvt. Ltd., 2,000 Kgs., Rs. 98,822.

XYLENE: From Japan: Kamal Trad & Contractors, 14,800 Kgs., . 1,12,914.

XYLENOL: From France: Dr. Beck Co., 3,040 Kgs., Rs. 88,543.

2,4 XYLIDINE: From Switzerland: dustrial Chemical Inds., NA, . 79,317.

PLASTIC MATERIALS IMPORTED BOMBAY (From 29.12.89 to 30.12.89)

HDPE: From Hungary: Novo Impex, A, Rs. 1,15,288; From Japan: N.D. astics, 50 MTs., Rs. 6,51,890; tional Plastics Enterprises, 4,800 gs., Rs. 6,48,263; From Saudi Arabia: mol Industries, 17,150 Kgs., . 2,27,022; Kosmo Packers, 17.15 Ts., Rs. 2,24,443; Pyarelal Tuganlal, ,150 Kgs., Rs. 2,12,281; VIP Inds. d., 171.5 MTs., Rs. 22,15,290; From SA: Associated Plastics Industries, 35 Ts., Rs. 4,01,531; Monofil Plastics, MTs., Rs. 6,22,556; Star Plastics, 100 Kgs., Rs. 69,778; Sumitra Plass Ltd., 68 MTs., Rs. 6,33,626; From ugoslavia: Columbia Leasing & nance Ltd., 20 MTs., Rs. 2,66,836; rover Overseas Pvt. Ltd., 5,000 Kgs., s. 6,63,885; Hukumchand & Sons, 0 MTs., Rs. 7,18,536; Veekay Marting Pvt. Ltd., 45 MTs., Rs. 6,06,470.

LDPE: From Yugoslavia: Grover verseas Pvt. Ltd., 80 MTs., s. 10,62,304; From Korea: Hari ishnu Packaging Ltd., NA, s. 3,05,570; From Yugoslavia: IPCL, 960 MTs., Rs. 69,41,443; From Sinapore: Propack Inds., 16 MTs., s. 2,28,429.

LLDPE: From Spain: The Bharat ijay Mills Ltd., 300 Kgs., Rs. 40,261; rom Saudi Arabia: Flex Laminates td., 33 MTs., Rs. 3,44,938; Flex apers Ltd., 16.5 MTs., Rs. 1,72,469; Ganapati Fishing Lines Pvt. Ltd., 16.5 MTs., Rs. 1,70,643; Grace Plastics, 16.5 MTs., Rs. 1,90,698; Hasthi Intl., 33 MTs., Rs. 3,27,30; Kosanes Packers, 16.5 MTs., Rs. 1,82,284.

PVC RESIN: From Argentina: Praful Exports Pvt. Ltd., 175 MTs., Rs. 20,82,038; Swastik Tubes Pvt. Ltd., 100 MTs., Rs. 11,89,735; From Egypt: Grover Overseas Pvt. Ltd., 133.748 MTs., Rs. 16,32,690; From FRG: Renu Pipes Ltd., 50 MTs., Rs. 6,10,350; From Mexico: Bhor Inds. Ltd., 300 MTs., Rs. 37,85,723; Billion Plastics Pvt. Ltd., 49.5 MTs., Rs. 5,90,797; Consumer Plastics Pvt. Ltd., 50 MTs., Rs. 5,90,837; Gandhi Plastics Inds., 49.5 MTs., Rs. 5,90,797; From Egypt: Grover Overseas Pvt. Ltd., 316.777 MTs., Rs. 38,17,050; From Mexico: Gupta Plastics, 298.3 MTs., Rs. 35,64,270; J.K. Rexine Pvt. Ltd., 199.5 MTs., Rs. 24,92,197; Metro Packaging Pvt. Ltd., 25.5 MTs., Rs. 3,09,190; Movilex Plastics Ltd., 149.5 MTs., Rs. 17,97,255; Omni Plast Pvt. Ltd., 50 MTs., Rs. 5,95,835; Plastotex Extrusion & Moulds, 100 MTs., Rs. 11,91,670; Premier Vinyl Flooring Ltd., 5,100 Kgs., Rs. 6,18,239; Rigidor Plastics Pvt. Ltd., 49.5 MTs., Rs. 5,90,779; Rigidor Plastics Pvt. Ltd., NA, Rs. 6,08,681; Star Oxides & Chem Ltd., 310 MTs., Rs. 38,36,577; Surya Power Ltd., 49,950 Kgs., Rs. 6,09,543.

PVC RESIN: From Mexico: Trimurti Foods & Pharmaceuticals, 97.5 MTs., Rs. 11,65,564; U.P. Asbestos Ltd., 95,500 Kgs., Rs. 11,58,163; From Saudi Arabia: Kundalia Industries, 200 MTs., Rs. 23,87,608; From Taiwan: Shiv Laminating & Cot., 10.5 MTs., Rs. 61,98,514; From USA: Finolex Pipes Ltd., 660 MTs., Rs. 70,99,290; From USA: Mehta Traders, 51 MTs., Rs. 5,85,096.

POLYPROPYLENE: From Australia: UP Filament, 3,200 Kgs., Rs. 4,47,149; From FRG: Cosmos Films Ltd., 80,480 Kgs., Rs. 27,762.

ed by R. Raghavan and published by N.R. Rajagopalan on behalf of owners, Sevak Publications, 306, Shri Hanuman
strial Estate, Wadala, Bombay-400 031. Madras Office : 27, Begum Sahib 3rd Street, 1st Floor, Mount Road, Madras
002. Phone : C/o 831808 and printed by N.R. Rajagopalan at Sevak Publications, 25, North Mada Street, Thiruvan-
ır, Madras 600 041. Phone : 419265. Registered with the Registrar of Newspapers for India vide No. R.N. 1972/57.

REGD. NO. TN/MS (C) 395 ISSN 0045/6500 R. N. NO. 1972/57

REGD. NO. TN/MS (C) 395

35th YEAR OF PUBLICATION

ISSN 0045/6500
R. N. NO. 1972/57

Chemical Weekly

VOL. XXXV FEBRUARY 27, 1990 NO. 25

Edited by R. Raghavan and published by N.R. Rajagopalan on behalf of owners, Sevak Publications, 306, Shri Hanuman Industrial Estate, Wadala, Bombay-400 031. Madras Office : 27, Begum Sahib 3rd Street, 1st Floor, Mount Road, Madras 600 002. Phone : 826 831808 and printed by N.R. Rajagopalan at Sevak Publications, 25, North Mada Street, Thiruvanmiyur, Madras 600 041. Phone : 419265. Registered with the Registrar of Newspapers for India vide No. R.N. 1972/57.


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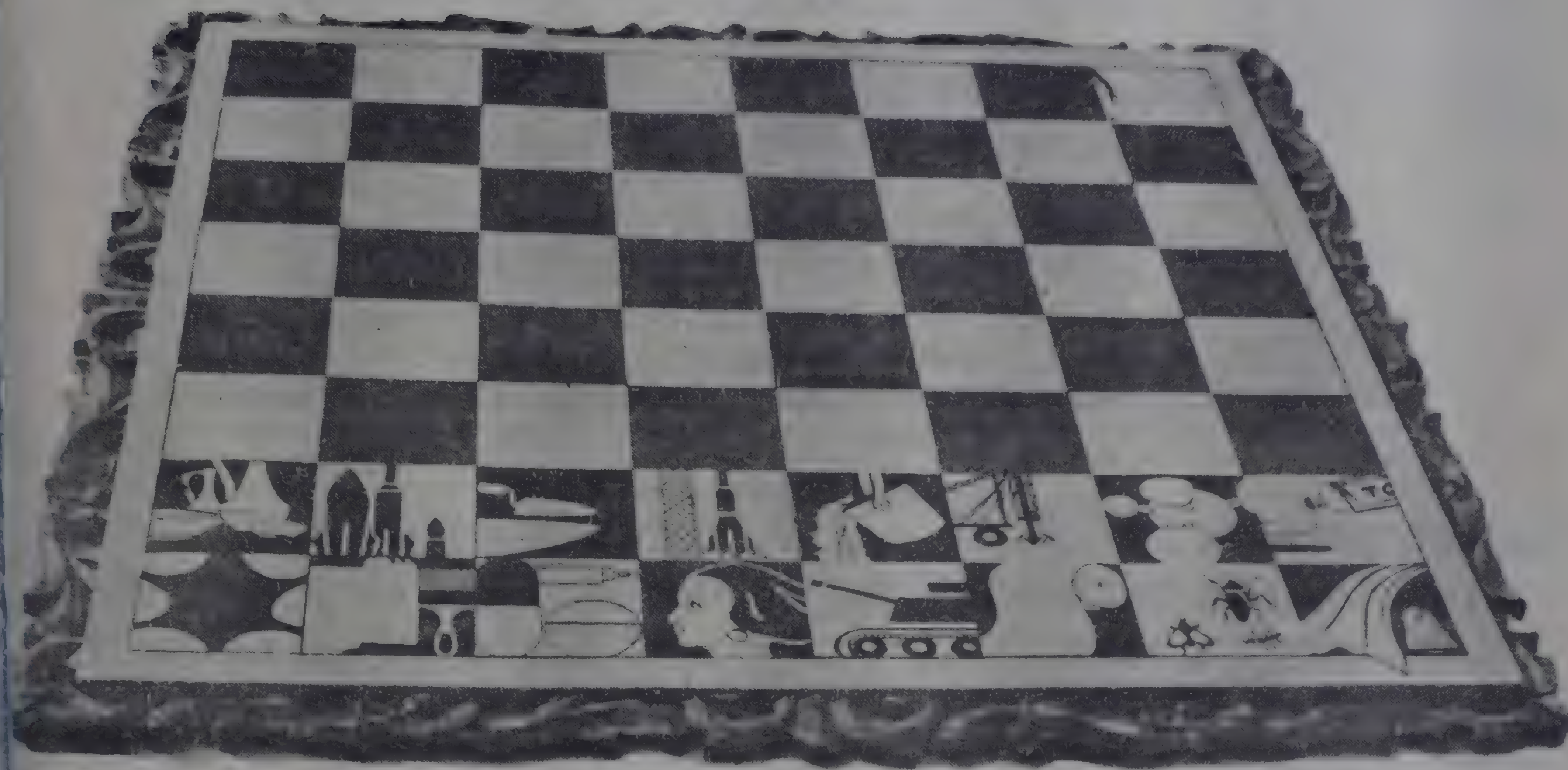

Chemical Weekly

VOL. XXXV FEBRUARY 27, 1990 NO. 25

Publishers:
SEVAK PUBLICATIONS

Editor - Publisher
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Administration/Circulation
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306, Shri Hanuman Industrial Estate
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BOMBAY 400 031.
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Telex: 011-76053 CWLY IN

Madras Office:
27, Begum Sahib III Street,
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Phone: 831808.
Telex: 041-6290 CWLY IN.

Printed at:
Sevak Publications,
25, North Mada Street, Tiruvanmiyur,
Madras 600 041.

Fast Print Service,
307/308, Shri Hanuman Indl. Estate,
G.D. Ambekar Road, Wadala,
Bombay 400 031.

Subscription Rates:
(Inclusive of Postage)
India: Rs. 400.00
Foreign: US$ 175.00 (Air Mail)
US$ 75.00 (Sea Mail)

Subscription charges payable in advance in favour of SEVAK PUBLICATIONS

CONTENTS

CHEMICAL WEEKLY

VOL. XXXV FEBRUARY 27, 1990 NO. 25

HERALDING THE 21st CENTURY - 40

an man solve the moral and ethical problems posed by new biology?

apid progress in biological sciences has brought in its wake many social, legal and ethical issues. In research ratories, medical practice, public health programmes, tic counselling and law enforcement, legal controver- and public debates have arisen, which offer serious chal- es to traditional interpretations of constitutional principles procedents.

homas Jafferson, one of the Founding Fathers of the ed States had enough foresight to State "our laws and tutions must move forward with the progress of the an mind."

echnology is a powerful force for change. Law, espe- y constitutional law, is a powerful reinforcer of stability continuity. The tension and compromise between the two much to do with how well a Society's political system adapt to econmic and social forces that affect the dis- tion of power and wealth.

here are increasing fears that advances in biological wledge and capabilities to intervene in human biology infringing man's privacy and constitutional rights.

e capability for biological interventions, especially with gard to reproduction, bodily health, mental functions, and eath, gives people new choices, and forces them to make ecisions about things that were previously beyond our ontrol. The question arises as to whether the State should constitutionally can regulate such decisions in the public terest.

iology-based technology, alone and in combination with ther kinds of science and technology, increases the power f the State to enforce its laws and policies (e.g. by screen- g for drug use, or by using DNA typing for identification). These uses will intrude on the constituionally guaranteed sphere of individual privacy.

3. The power to identify biological risks (e.g. exposure to infectious disease or genetic vulnerability to chemicals in the environment) often outstrips the capability to remove or reduce those risks. This raises a demand for social control measures that sometimes impinge on constitutional freedoms. Some of these are traditional public health techniques falling under States' "police power" but now often at odds with increased public expectations of, and judical affirmation of, the scope of constitutional liberties.

4. The increasing possibility of effective itervention to prolong life, remove physical and mental handicaps, and enhance physical and mental performance reinforces the growing assertion of a "right to health care".

5. Biological knowledge is likely to impinge on formal or informal religious beliefs or at least on traditional formulations of religious doctrine.

There are strong indications that biological research will provide increasing evidence for a genetic and biochemical basis for variations in human abilities and performance and for much human behaviour, including some behaviours that we now regard as voluntary, and therefore punishable. New pharmaceuticals, psycho-surgery, or other treatments will become available to moderate mental functions and modify behaviour. Genetic engineering of human germ cells or somatic cells could remove inherited mental traits.

Biology is allowing major human interventions at the boundary between life and dealth. By resting the definition of death on brain functions, we have raised the question of how much quality or competence in brain functioning is nec-

essary for recognition of constitutional rights. By making it possible to artificially maintain bodily functions we have vested in some people, with or without their willingness, awesome responsibilities for making decisions about life and death for other people who can no longer decide for themselves. At the beginning of life, advancing technological capabilities have changed, and may further change, the point at which a new life is viable outside the womb -- indeed, gestation from test tube to "birth" may someday be possible in artificial wombs, reflecting again the question of when constitutional rights begin.

Advances in biological sciences and technologies are creating choices, in situations where in the past people had no choice. Or, less positively, they force people to make decisions about situations that in the past were beyond human control. Increasingly (though not yet always) people can choose whether or not to reproduce, and in the future, they may be able to routinely choose the gender of the child they wish to have, to select some of its genetic characteristics, to choose to use an embryo from other biological parents, or to donate their own embryos to others.

New biological knowledge and technologies give people powers to make critical decisions about the life and death of themselves, other people, and future generations. When technology allows people to make such choices or decisions, the questions arises as to whether the State should regulate, or even absolutely control, those decisions. Constitutionally, this question becomes; would State intervention impinge on some individual liberty that is guaranteed by the Bill of Rights? and if so, is the individual's interest in exercising that right far outweighed by the contrary interest of the State, which is considered to be the public interest?

The balancing of the State interest with individual rights is forever going on, and where the balance is struck often involves two kinds of social change. One frequent factor is new technological capability that gives us new control of natural processes or new power to manipulate our physical and biological environment. The second is the rising expectation of self-determination and privacy.

Some traditional public health techniques, well established in law and in constitutional decisions as permissible under State police powers, are almost certain to be challenged anew because of today's broader interpretation of individual rights of privacy and autonomy. This is occurring, for example, in the context of the AIDS epidemic with regard to techniques of mandatory reporting, contact tracing, mandatory testing and partial or full quarantine. As the risks of environmental and workplace contaminants are increasingly revealed the State could decide to use genetic screening technology (now at an early and unsatisfactory state of development, but likely to be made much more effective in the future) to write [...]ulations forbidding some groups of people from assu[...] occupational or environmental risks to which they are e[...]cially vulnerable.

Many kinds of medical and genetic interventions r[...] complementary questions. First, when can the State, i[...] exercise of its police power, legitimately mandate pre[...]tive or therapeutic treatment, as it has long mandated [...]cination, in the public interest? Second, should the C[...] (or Congress) at some point in the future rule that the[...] a constitutional basis for a "right to health" or at least to h[...] care? If, for example, interventions became possible ([...] result perhaps of research at the National Institutes of He[...] that would significantly control or slow aging and ex[...] normal lifetimes, say by 25 years -- would we leave [...] market mechanisms to detrmine who received this "price[...] boon?

Decisions about kidney dialysis and organ transplants [...] so far obscured and delayed rather than answered this [...]tion, which is already being raised by some public int[...] groups not only as a public policy issue but as a con[...]tional challenge. They argue that Americans have an "[...] protection" right to the results of medical research supp[...] by taxpayers.

Recent decisions about the teaching of evolution [...] "creation science" in public schools have not remove[...] possibility of further efforts to restrict either the teachi[...] the application of new biological knowledge on religio[...] quasi-religious grounds. There are strong indications t[...] major area of constitutional debate in the future will deal [...] conflicts between biological research objectives and p[...]dures, on the one hand, and religious or ethical values c[...] other. The present debates over animal rights, research [...] foetal tissue, patenting of human cell lines and derived [...]logicals, the safety of bioengineering laboratories, and re[...] of engineered organisms in the environment, have [...] common grounds. Is there a constitutional right t[...] research? Should there be areas of "forbidden knowle[...] What values should be reflected in Federal research fu[...] allowation and Federal guidelines?

In looking into the future, much can be anticipated but [...] can be said with certainty. When we consider the triple u[...]tainties or rapidly advancing knowledge, steadily rising e[...]tations of civil liberty and self-determination, and confli[...] value systems that are themselves caught in turbulenc[...] challenge, there are indeed few certain answers to the [...]blesome questions raised here.

—T.P.S. RA[...]

(Source: Special Report on Biology, Medicine and B[...] Rights, U.S. Congress [OTA]).

CHEMARENA

L. VENKITESWARAN

Ethyl Alcohol problems to continue?

The recent meeting of the Central Molasses Board has not n able to project a long-term view on the problems of lasses utilisation and in turn on utilisation of alcohol made n it. The problems of interstate allocations of both lasses and alcohol besides the taxation on alcohol conue to be the main preoccupations. There has been empha- on the development of other raw materials like tapioca, ize, sugar-beet etc for production of alcohol for deficits otable liquor demands within a state has not made much gress and the claims on cheaper molasses based alcohol m surplus states dominate the discussion. It is probably time for a new approach to this recurring issue and take ecision once and for all that molasses-based alcohol will far as possible be reserved for industrial use within the ducing state and only marginal quantities be allocated for elsewhere. A state like Andhra Pradesh and Karnataka ich now uses the greater part of their production of lasses-derived alcohol for potable use may have the option ontinue to do so or develop other sources for potable alco- and encourage more chemical projects.

The other vexed question of taxation had been before the reme Court and the judgement at the highest judicial level ulates that states have no right to tax alcohol used for indu- al conversions. This judgement has yet to be accepted in right spirit and given effect to by the states. There is much enditure in the administration of the controls over lasses and alcohol exercised by the state government and se have to be reimbursed by a small administrative charge he alcohol—a practice which was in force years back until y were replaced by a plethora of levies under different nes, in some case adding to the costs of alcohol by 30 to to the industrial users.

The demand for potable use has been creeping up but cer- ly not at the levels at which the availability of molasses roduction has been rising. According to official estimates actual use in 1988-89 was 416 million litres out of a pro- tion of 797 million. For 1989-90 the estimates are 474 lion litres (about 14% increase) out of a production of 926 lion litres. There is generally an element of inflation in demand estimates by the states, particularly those which deficit and have to meet their demands to a large extent supplies from other states. A brief comparison of the data major states is as under. There is a big jump in demands of some states — Kerala by 35%, Karnataka by 35%, Punjab 23%, Rajasthan 50% and Madhya Pradesh by 20%. This is in spite of the policy to develop alternate sources for alcohol in deficit states. Certainly some strict directions are needed if we are to concentrate on the gainful utilisation of alcohol.

Potable Alcohol (in million litres)

	Actual 1988-89	*Estimate 1989-90*
A.P.	648	681
Bihar	136	140
Haryana	161	170
Kerala	137	175
Karnataka	407	540
Maharashtra	640	650
Punjab	196	240
Rajasthan	163	245
M.P.	224	266
Tamil Nadu	165	180
W. Bengal	129	150
U.P.	937	950

The data realting to industrial uses confirms the dependence of some states on supplies from other states due to their build up of more capacity for chemicals or revival of old shutdown plants. Maharashtra, Tamil Nadu and U.P. have sizeable surpluses even after diversion of some quantities to other states and therefore have scope for more capacities for chemicals — much of this appears to have been earmarked for schemes already approved. W. Bengal continues its dependence on U.P. for feeding the revived old polyethylene plant. Certainly this plant should shift to ethylene from the Haldia Cracker which is expected to go into operation in 1992.

The molasses production in 1989-90 is expected at 4.2 million tonnes a jump of 20% over the earlier years. There are arguments on the possible surplus and a strong lobby for export of molasses which after depressingly low and unworkable price levels have now moved up substantially in the international market. The country's long-term and overall interests lie in the conversion of molasses into highest value products which would need to be imported at far higher cost in foreign exchange than possible by export of molasses. With the targets for sugar placed at over 12 million tonnes for the

8th Plan and for molasses proportionately higher it is urgent that plans for alcohol and chemicals are expeditiously taken up. The chemicals are also to be so chosen as to be ***prima facie*** economic at lower capacity levels as compared w production in the much higher capacity levels from petrole feedstocks.

Brazil's problems

While on this subject of alcohol it is surprising to note that Brazil's great programme of using alcohol as fuel for motor vehicles has run into rough weather this year. The policy for cutting down on foreign exchange through the substitution of petrol by alcohol, largely from sugarcane, resulted in 4 million cars running 100% on neat alcohol and 9 million using a blend with petrol. Now the rise in price of sugar has resulted in the diversion of sugarcane to higher production of sugar with less left for conversion to alcohol. It is not known to what extent the situation is critical but Brazil is seeking to import alcohol - either ethyl or methyl—and even the more costly MTBE to make up the deficit. At one stage Brazil exported at lower prices ethyl alcohol to U.S.A. in sizeable quantities and upset U.S.'s own programme of using ethyl alcohol produced from corn for blends with gasoline. T outcry from the U.S. farm lobby resulted in the levy of a d on such imports to shut down the Brazil invasion. Now Br is importing 400 million litres of alcohol from AI —Archer, Daniels, Midland — the largest corn based p ducer in U.S.A. and catering for the gasohol needs in U.S More such imports may follow perhaps cutting into the of 3 to 5 billion litres of alcohol in motor fuels in U.S The international picture on sugar or molasses fluctu between shortages and surpluses and varying levels of pr and it is not wise to base our policy on the vagaries of export market for alcohol and molasses but link it to an o nised and rational programme of utilisation for useful ch icals within the country.

Lignin — Usage and markets

Technologies for pulping of wood or other fibrous materials have advanced in recent years and are moving towards the recovery of all the main components—lignin, hemicelluloses and cellulose— so that there is scope for a wider market base than merely pulp and paper. The sulfite pulping process gives a liquor containing small quantities of glucose and the liquor was fermented and ethyl alcohol recovered before the residual solids—lignin, pentosans etc—were concentrated and burnt as fuel for the conversion. Kraft pulping does not give any sugars and again the objective is use as fuel and recovery of chemicals. A certain amount of the lignin sulfonate is recovered and also converted into vanillin. 20 million tones of lignin is generated in U.S.A. and most of this is used as fuel for pulping.

The interest is generally on the use of lignin as a component of plastics for engineering application. After all it is the backbone of the very resistant lignocellulose molec Modified lignin has shown some promise. It has a polyph lic structure and hence appropriate for incorporation into nol-formaldehyde adhesives. Hydroxy methylation impr reactivity for use as an integral part of P.F. resins. It is n tioned that 55 to 60% of the phenol can be substitute lignin derivatives. It can be used in rigid fire resistant yurethane foams. Hydroxypropyl lignin can be useful fo resistant polyurethane foams for structural application

The new methods of separating lignin from lignocel ses by steam explosion or alcoholic alkali treatment may up wider uses. It is projected that by AD 2000 some 5 lion tonnes of lignin may find use other than as fuel—oil chemicals, agro chemical, asphalt extenders, carbon blac We may have to consider this base agroproduct for w use through R & D.

Bayer's Tower Biology for Waste Treatment in U.S.A.

Bayer in W.Germany has pioneered the design and installation of high tanks or Tower Biology for bacterial degradation of wastes under aerobic conditions. This is an extension of the activated sludge system and the bacteria are fed by oxygen in the high tower. The effluent is first clarified in a primary clarifier to remove lighter than water insoluble contaminants which are skimmed off and then enters the tower. Heavier particles settle down in the clarifier and are removed. The height of the tower provides enough time for bacteria to act and cut the BOD by 93 to 97% in the few hou passage. The U.S. unit is at Bayer's own plant at Bayt Texas and of 60 ft height for treating 1 million gallons and costs $10 million but cuts down on the energy ne for conventional tank aeration.

A post treatment with active carbon removes non b gradable organics. A small unit of this type is also in ration in Bayer's plant in Thane, Maharashtra.

World Bank forcing cuts in polymer duties

World Bank is putting pressure on the Government to reduce import duties on polymers. The first round of talks in this regard have been held with the Petroleum and Chemicals Ministry.

The World Bank move follows its funding on a large-scale of petrochemical projects in the country which ultimately produce polymers. This is in line with the overall World Bank objective to bring down tariff barriers in India and link the country with the international economy.

Surprisingly, the Finance Ministry is reported to be working on a plan to take import of polymers from Open General Licence and place it on the restricted list, as part of the new Exim policy to be announced on April 1. This will automatically mean termination of the stock and sale policy introduced two years ago which permits import of polymers by anyone for trading purposes. This covers all plastic raw materials except polypropylene.

The stock and sale imports policy attracted a lot of traders, many of them unconnected with plastics, to resort to import of polymers as a means of making quick money. Some unscrupulous elements, especially in the Eastern region, resorted to under invoicing and other malpractices. Indigenous producers also complained of large-scale speculative imports by traders, though processors say these reports are exaggerated.

From the processors' point of view, stock and sale had ensured a high degree of freedom and availability for the asking. The global crash of polymer prices last year came as a blessing for processors as traders made available material which was substantially cheaper than indigenous material.

Processors by and large feel the move will turn back the clock to the situation which prevailed some two decades ago, when import was a frustrating exercise because of the delay and corruption which the licence regime entailed. Out of an estimated 2,000 processors, only a few hundred have the wherewithal to import on their own. In Delhi, there are small processors who carry a bag each from the depot to their factory twice or thrice a day to feed their machines. Indentors can continue as at present but traders will have to buy REP licences in the market if they want to continue in business. Only a fraction of the actual users will be able to import on their own.

Reports are that Government could meet the World Bank half-way by scaling down duties but restricting imports by taking them off OGL. Indications are that revised import duties for select polymers may be announced before the budget, even as early as March 1. Officials are now convinced that the hike in duties at a time when global prices are on the uptrend, was ill-timed, if not unwarranted. The bigwigs who successfully lobbied behind the scenes have now been identified. The changes were effected without taking the Ministry of Petroleum and Chemicals into confidence.

Processors say they cannot afford to keep more than one month's stock. There are reports of distress selling as traders want to get rid of stocks on which they have paid high duties. Prices in the international market have firmed up by US $50 a tonne in recent weeks. The latest prices are HDPE $950-1000, LDPE $900, PVC $700-750, PP $900 and PS $1200-1300.

PORT DIVERSION PUTS CHEMICAL UNITS IN A FIX

The Government directive to divert all dry bulk cargo to Nhava Sheva Port has put many chemical units in Bombay in dire straits. The Minerals and Metals Trading Corporation (MMTC), the canalising agency for import of sulph and other bulk raw material has ask them to lift the material from Nha Sheva instead of the Bombay p These units find the cargo handling c at Nhava Sheva, much higher th Bombay port. According to the Nhava Sheva charges Rs. 180 per ton for handling bulk cargo as agai Rs. 60 at Bombay. Moreover, the st age charges at Nhava Sheva works to more as the port gives only five d free storage facility.

Even after paying the higher rates, users find it difficult to bring the ma ial out of the port as transport facil are totally inadequate. Some of the u had to suspend production as they co not get raw materials in time.

The Indian Chemical Manufactu Association (ICMA) has sent an SO the Petroleum and Chemicals Min and the Union Surface Transport M try asking them to take immediate m sures to resolve its members' probl The Association had also made a resentation to the Nhava Sheva authorities.

According to industry source these hardships could have avoided if the Government had sulted the industry before dire Bombay port to divert all dry bulk to Nhava Sheva. In order to cov its mistakes in planning port dev ment, the Ministry is now resorti ad hoc measures like diverting a pa lar type of cargo to the new port allege.

According to port officials alth the bulk handling rates are hig Nhava Sheva compared to Bomb works out cheaper for the users cargo handling is much faster at N Sheva.

At Bombay port, the bulk carg sels have to wait for days to get but at Nhava Sheva they can unlo cargo the same day as they arr

COMMISSIONING OF MANALI PETROCHEM

Trial run to be on schedule

With the formal energisation slated for the last week of February, the stage is set for the run of the Manali Petrochemical Limited (MPL). A visit to the factory at Manali suggests that the plant will go on stream as scheduled and trial production is to commence by April end, according to company sources. The company has already committed supply of its product to one of the Madras-based units in the first week of May and the sources are confident of fulfilling this order. The energisation of the main station was in fact to have been done on February 20 itself but due to a minor issue it has been postponed by four or five days. The chief electrical inspector is visiting the plant to give final touches to the energisation programme.

Once this was completed the firing, a symbolic but crucial event, will take place by early next month followed by other technical tests. All these will be over before the end of April to enable the managers to give the green signal for the trial run for a few days. This Rs. 100-crore project and 100 per cent import saving plant will manufacture propylene oxide, propylene glycol and polyols with a capacity of 12,000 TPA and 6,000 TPA respectively.

At present all these are imported costing the nation around Rs. 50 crores to Rs. 60 crores annually. During the first year the plant will have the capacity utilisation of 70 per cent which will gradually be increased to optimum size. In the same vicinity another project of the UB group in collaboration with the Tidco for the manufacture of the same item coming up with similar capacities. In fact the boiler firing of the plant had already taken place last month end when Mr. Vijay Mallya was in town.

The project cost of this plant is Rs. 71 crores though there are indications of moderation in total outlay. This plant has Italian collaboration while the MPL's chosen technology is from France for propylene oxide and glycol and US for polyol.

Though both the plants are to manufacture same products with a combined capacity of 24,000 TPA and 14,000 TPA respectively the process route chosen is different. The UB group has preferred "gas-based" route for polymerisation while MPL has gone in for "liquid based" method. This partly explains the variation in the costs of the two projects though there are other reasons also for the difference.

Both the plants will have to depend upon the neighbouring Madras Refineries Ltd. for basic raw material. Meanwhile, according to sources MPL's public issue is believed to have been oversubscribed by over 20 times though a final tally is yet to be received from the bankers. MPL has been promoted by the SPIC group with equity participation worth Rs. 11.40 crores.

GOVERNMENT URGED TO ALLOW ALCOHOL EXPORTS

The All-India Distillers' Association has demanded that the government should immediately allocate 1,400 lakh litres of alcohol for export out of the total surplus stocks. This, according to the association, will enable the distilleries to function uninterruptedly and the country to earn foreign exchange to the tune of Rs. 740 million. In a letter to the Petroleum and Chemicals Minister, the association has warned that if the allocation of alcohol for export is not made at this stage, the distilleries will start closing down within a month or so resulting in the overflow of molasses, curtailment of capacity utilisation and loss of foreign exchange.

According to the association, export orders amounting to 531 lakh litres against contracts entered into earlier still remain to be executed. The associati also wanted the allocation to be ma after careful monitoring of the positi in the coming months. The associati has pointed out that the states have r taken into account the molasses sto with the distilleries at the opening of current alcohol year whereas the dis leries had a sizeable quantity in sto

In Uttar Pradesh alone, the distill ies had 1.12 lakh tonnes of molas stock in November 1989. The total st of molasses with the distilleries in the states is estimated to be about lakh tonnes. Out of this, even if f lakh tonnes would yield 940 lakh lit which would increase the current y surplus to 3,181.88 bulk litres.

Molasses production during the y has been estimated at 42.94 lakh ton which according to the estimates of industry, is not realistic. Looking to area under sugarcane and allowing the fact that the crushing of cane co menced early this year and is propo to be continued till June 1990, the su production is estimated at a minim of 105 lakh tonnes which will yield 25 lakh tonnes of molasses.

POLLUTION CASE: NOTICE U.P.

The Supreme Court issued notic the State of Uttar Pradesh and other a public interest litigation petition directions to prevent environment lution caused by oil mills and a re ery plant located near Saranath (Varanasi), a Buddhist pilgrim ce and nearby villages. A Bench con ing of the Chief Justice, Mr. Saby chi Mukherjee, Mr.Justice K.N. S and Mr. Justice M.M. Punchhi, n the notice on the petition from the K triya Pradushan Mukti Sangarsh S thi, Saranath, returnable on April 2 petition said the smoke from the oil and effluents released by the refi plant were polluting the environm besides causing respiratory and c diseases to persons living in the

robe into Ion Exchange chemical plant safety

he Maharashtra Government is ordering a fresh probe into the working of Exchange (India) Ltd. which runs emical plant at Ambernath.

he Government sources say that the e is essentially to make sure that the t is safe enough to handle the hazus chemical, chloromethyl ether E).

he company drew a lot of flak ntly after the workers alleged that ss than five of their colleagues died ng to exposure to the chemical. The hs had occurred over a span of five s and the management blamed that nvironment in and around Amber- is highly polluted.

hough all the workers have resumed k after a brief strike, the State Govnent has decided to conduct a probe see if anything is wrong with the t. The Ambernath factory was the and oldest plant set up by Ion hange (India) Ltd.

transpires that when the first cancer h took place at Ion Exchange, the ory Inspectorate had ordered clo- of the unit altogether. But the ronment committee headed by Dr. g held the view that with certain lifications, the plant could be made safe.

he State Government officials aver necessary modifications have been carried out by the company. The pany sources point out that it has only carried out the modifications uggested by the environment comtee, but has even embarked on a demisation programme.

ast year, the company spent nearly 2 crores on this account and a sum Rs. 50 to Rs. 60 lakhs will be utilised this purpose this year. It is underod that the Government will soon appoint a two-member panel to look into the functioning of the chemical factory. The Government, it needs to be pointed out, has not taken kindly to the company statement that it is not responsible for the cancer deaths of its five workers.

TRAINING PROGRAMME FOR DRIVERS CARRYING HAZARDOUS GOODS

As part of its efforts to improve safety in product transportation, National Organic Chemical Industries Ltd. had sponsored a three-day training course, beginning from February 15, 1990 at the Advanced Training Institute, Sion, Bombay for drivers of trucks/lorries and tankers carrying hazardous goods. Equipment worth Rs. 10 lakhs has been offered by National Organic Chemical Industries Ltd. for the purpose.

The course had been designed by NOCIL in consultation with the Transport Commissioner, Loss Prevention Association of India and the Advanced Training Institute. Such training programme was the first of its kind in India, and will also be available to transport contractors for training their drivers or to individual drivers who wish to be qualified.

The programme is recognised by the Transport Commissioner, Government of Maharashtra. All industries in Maharashtra can take advantage of the training programme. The faculty will be drawn from the Loss Prevention Association, NOCIL and the Advanced Training Institute, Sion. At the end of the course, certificates recognised by the Government of Maharashtra were distributed to the participants.

This will be an on-going programme and training will be conducted once in three weeks on a regular basis.

Larger export obligation in Nylon-66 project

The Thapar-Du Pont project proposal for the manufacture of Nylon-66 is to be considered afresh on the basis of a larger export commitment. A revised proposal for the Rs. 180-crore project which has been hanging fire for the last two years on account of controversies is to be submitted shortly for clearance. In a sharp departure from the earlier proposals, the fresh application, it is learnt, will include a commitment to export a certain percentage of the Nylon-66 fibre output from the joint venture. In fact, the US multinational Du Pont is understood to have agreed to vacate a few of its captive export markets in Asia, the Far East and other countries in favour of the joint venture's product.

The Thapars have been frantically trying to revive the project proposal, a decision on which had been deferred ever since the National Front came to power at the Centre. At one such meeting with top officials of the Ministries concerned, the Thapars were categorically told that the major yardstick for clearance of the proposal would be the export obligation of the project in question. As such, a mere 40-42 per cent export obligtion by the flagship Ballarpur Industries as a group would not suffice. In effect, the first stage clearance itself would depend on the export commitment by the joint venture partners from the Nylon-66 project.

The positive response of Du Pont as communicated by the Thapars to the Ministries concerned is a result of the stiff stand taken by the Centre. As things stand, Thapar-Du Pont may have to commit at least 30% of its Nylon-66 production for exports apart from the 42% already committed from the other new products of the Thapar group. This is because the company would have to export a total of 72% of its production in value terms to offset the drain on foreign exchange due to the import of only raw materials, namely AH salt and/or adipic acid. Incidentally, Du Pont is investing in a large venture in Singapore to manufacture adipic acid. Amongst the various customers, this venture will also be a captive source for the Nylon-66 venture in India.

It may be recalled that the initial proposal by Thapar-Du Pont for the manufacture of Nylon-66 which is used by the tyre units to make nylon tyre cord had been rejected earlier following vehement opposition by the existing Nylon-6 manufacturers. The rejection was on the count that the project would not lead to any update of technology, an export obligation of 25 per cent was low and that it would lead to a perpetual drain of foreign exchange as AH salt was to be imported from the US.

Later, a modified proposal was submitted in which the export obligation was increased to 42 per cent through the export of new products by Ballarpur Industries. This was also contested by the Nylon-6 units for, as per the calculations, the foreign exchange drain could be offset only at 72 per cent export of production. Interestingly, the Union Government had made attempts to clear this proposal just on the eve of the elections last year. The administrative machinery was activated at a time when even decisions on routine representations come to a standstill. An emergency meeting of the special Projects Approval Board (PAB) was convened to accord first stage clearance to this project along with others through the fast track. The meeting was, however, cancelled at the last minute, perhaps out of fear of adverse publicity.

Apart from the export obligation, the Government does not given much cognisance to the Nylon-6 industry's arguments about self-sufficiency in caprolactam (raw material for Nylon-6) in the very near future as compared to the perpetual imports of a salt or adipic acid.

SUPPLIES APLENTY, YET I… PLANS PARAXYLENE IMPO…

The country is spending fo… exchange worth US $1.6 million f… import of paraxylene at a time … indigenously produced paraxyle… going abegging. IPCL, the cana… agency for the import of this basi… material for the production of DM… PTA, has finalised a deal with M… of Japan for the import of 4,000 t… of paraxylene at c & f price of $4… tonne. The material is expected to … Bombay by mid-March 1990.

Paraxylene is locally produc… IPCL, Reliance Industries and B… All these plants have their captiv… sumption of paraxylene for the pr… tion of DMT and PTA, while Bo… Dyeing has to depend on outsid… plies for the production of … Bombay Dyeing produces a… 60,000 tonnes of DMT per annu… which it requires 42,000 to 4… tonnes of paraxylene. A meeting o… ducers and consumers of parax… was held in New Delhi on Janua… 1990, to discuss supply and de… position for the material, which w… lowed up by another review mee… Bombay on February 5, 1990.

"We had conveyed our requir… to the canalising agency and we… that it is taking steps to me… requirement of paraxylene", … spokesman for the Bombay D… BICP in its report submitted i… 1988 has worked out IPCL's para… price at Rs. 9,850 per tonne and n… government is in the process o… ising the fair selling price for the … tic supply, he added. A spokesm… the Reliance Industries has ex… surprise at the government deci… import paraxylene when the co… had offered to supply 8,000 to… the material during Feb.-Mar… further quantity of 12,000 tonnes… April-June quarter.

Panel, expert groups on drugs

The Union Government has set up a permanent standing committee and three expert groups to consider all issues relating to drugs. Headed by the Secretary in the Department of Chemicals and Petrochemicals, Mr. M.S. Gill, the 12-member standing committee will consider all matters connected with the review of the Drugs Price Control Order (DPCO), 1987. This includes the various policy issues as also the representations received from the Members of Parliament and other sources.

The committee will be assisted by the three expert groups on therapeutic issues (Group I), technology issues (Group II) and production and turnover issues (Group III). The three groups consisting of nine members each, will examine the issues regarding the DPCO 1987 and the representations for inclusion or exclusion of drugs from the scheduled categories.

The report of the expert groups, which will meet once in three months or as and when required, will then be brought before the standing committee for its consideration and final recommendation. Apart from the Secretary (Chemicals and Petrochemicals) as the Chairman, the other members of the standing committee are Secretary, Department of Biotechnology, Additional Secretary (Health), Ministry of Health and Family Welfare, the Director General of Health Services, the Deputy Director General (Chemicals) in the Directorate General of Technical Development, the Member (Finance) of the Bureau of Industrial Costs and Prices (BICP), Mr. N. Sen, Adviser in the Council of Scientific and Industrial Research (CSIR) the Directors of the Indian Institute of Chemical Technology, Hyderabad and the Central Drugs Research Institute, Lucknow and three other high officials from the Department of Chemicals and Petrochemicals.

While the expert group on therapeutics is chaired by the Director of the Central Drugs Research Institute, Lucknow, the group on technology is headed by the Director of the Indian Institute of Chemical Technology, Hyderabad. The third group on production and turnover, however, has the Joint Secretary in the Department of Chemicals and Petrochemicals as the Chairman.

The other members of the three groups are drawn from all the connected institutes and organisations and the concerned Government Departments, the medical profession, the chiefs of the public sector drug units. Some of the officials of the Department of Chemicals and Petrochemicals are members of all the three groups.

The constitution of the standing committee is expected to streamline and expedite matters, particularly in respect of expansion and deletion from the scheduled categories of drugs. As is usual, there is bound to be a host of questions in Parliament regarding the DPCO. Instead of the earlier procedure of referring the matters to BICP and other review committees, the standing committee with the help of the expert groups will deal with these matters faster.

Mr. M.S. Gurupadaswamy, Petroleum and Chemicals Minister, has ordered a full-scale inquiry into the 1986 drug policy which yielded the Drug Prices Control Order, 1987. Mr. Shyam Suri, Joint Secretary in the Ministry, in letters to drug companies has said, "the Government is considering review of the 1986 drug policy containing measures for rationalisation, quality control and growth of the pharmaceutical industry. You are requested to give considered views keeping in view the goal of making drugs and pharmaceuticals available to the masses in abundant quantities and at reasonable prices. The Government also wishes to facilitate introduction of newer drugs in the country and to strengthen the base of local industry both in drugs intermediates and in bulk drugs. Import and export policies concerning this sector are also proposed to be examined to serve the overall national objectives".

Incidentally, Mr. Shyam Suri been shifted but the Government continue with a total review. Ind sources are peeved over the move halts liberalisation introduced by previous Government in giving hi prices for drug manufacture. They tend — and they are right — that ev thing the last government did wa wrong and the 1986 drug policy vetted after four years of discus with numerous working groups s to look into every aspect. Even afte announcement of the Drug Prices (trol Order 1987, the Government s the Kelkar Committee under Dr. Kelkar, chief of BICP, to make recommendations for including dru the Category 2 list. Dr. Kelkar had specific recommendations to reduc number of drugs under price contr it was an impossible task for the m try to okay every price increase.

The Government decision impi full stop to all decision making or aspect of drug policy — pricing, products, expansion — as the pet egy will be to wait for the new policy. Slowly but surely Mr. Guru aswamy is revealing his stand — n improve the working of drug unit to look into past actions. Bureaucra really upset but are in the same pr ament as those under Mr. Unnikrish who is keen on killing C-Dot ever means bringing a hoard of multina als into the country.

The letter to drug units adds: " views may kindly be sent to us w three weeks. We also propose to nise a seminar under the chairmar of the Minister for Petroleum Chemicals, where important issue be presented and discussed. This please be given top priority."

While announcing "measure rationalisation, quality control growth of drug and pharmace industry in India," on Decembe 1986, the statement said the new p is being restructured in the lig experience gained and keeping in the objective of achieving "Healt all by the year 2000 AD."

Ministry to work out fair price for paraxylene

The Ministry of Chemicals and etroleum has been told to work out a air price for paraxylene taking into ccount production costs of Reliance ndustries Ltd., IPCL and Bongaigaon efinery. It follows two sets of fair prices orked out by two wings of the Finance linistry. BICP has worked out a fair rice of Rs. 9,852 per tonne for IPCL's xpanded production. It could not arrive the fair price for RIL as it refused to rovide the cost data. The costing secon of the Finance Ministry has worked ut a fair price ranging between s. 14,000 and Rs. 18,000 per tonne nding the Government in a fix.

The Chemicals Ministry has also en told to arrive at an import duty and etermine the canalisation status of araxylene. BICP has recommended an nport duty of 25 per cent and OGL atus in the short-term.

Reports are that the Ministry is working on a single price which will be favourable to IPCL as costs of RIL should be higher though none knows its installed paraxylene capacity or its price. If it is prepared to export 10,000 tonnes of paraxylene at around Rs. 8,000 per tonne, clearly its costs cannot be above it as none exports at a loss. Industry circles, however, dismiss the export tender as more of a clever ploy to halt imports of paraxylene.

For Bombay Dyeing, the pricing of paraxylene is crucial as the company plans to go ahead with its DMT expansion capacity from 60,000 tonnes to one lakh tonnes per annum. Earlier, it was projecting a cost of around Rs. 70 crores for reaching the minimum economic capacity based on West German technology. But now, it is scouting for a US knowhow which should halve the costs as it seems to have developed an alternate technical route.

It also implies that the company will have to depend long on imported paraxylene till domestic capacities are sufficient. The current imports of 4000 tonnes by IPCL will last it for just over a month and the Government will have to take a long-term view. One option should be to revive IPCL's plan to produce paraxylene which got shut down by Reliance.

PLASTIC UNITS RESENT DUTY HIKE

The All-India Federation of Plastic Industries has urged the Centre to withdraw the recent hike in customs duties. Otherwise, a large number of small and medium plastic units would be forced to close down. In a press statement issued at New Delhi on February 16, the Federation President, Mr. Virender Kumar, also requested the Government to prevail upon the domestic raw material suppliers not to increase their prices arbitrarily.

STYRENE BUTADIENE PROJECT

SI Viscose awaits Centre's approval

In quick succession, the South India Viscose Limited, the Coimbatore-based large house, is moving the Centre for putting up a Rs. 41-crore project near Madras for the manufacture of styrene butadiene (SB) with a capacity of 10,000 TPA.

Only recently, its earlier project for the manufacture of vinyl acetate monomer (VAM) was turned down by the government on the ground that the new material required for this Rs. 36-crore project (also in Tamil Nadu) was not assured to the company.

The present project, if approved, is to come up near Manali, the fast developing petrochemical complex. According to the company, the estimated annual turnover of the present project would be around Rs. 35 crores. The project cost of Rs. 41 crores would be met by the company through loans from financial institutions, debentures issue of Rs. 30.75 crores and the balance Rs. 10.25 from internal resources.

The company is a market leader in the manufacture of polysonic staple fibre. The rejected project had projected a capacity of 10,000 TPA of VAM. One of the main reasons for the rejection of the Rs. 31-crore project was that the demand scenario did not justify creation of fresh capacity. There was already the licensed capacity of 55,000 TPA, as against which the project demand was 44,000 TPA by the end of the 90's, according to the objectors.

The two objector companies had stated that they had well absorbed the technology for the manufacture of VAM and, therefore, there was no justification for expenditure on foreign exchange for repetitive import of know-how for t project. There was also the repor underestimation of the project cost, argued the objector.

PROFESSOR B.D. TILAK ENDOWMENT LECTURESHIP

Professor R. Kumar, FNA, FAS Professor of Chemical Engineeri Indian Institute of Science, Bangalo will deliver a course of two lectu under this Endowment as per the f lowing details:

Topic: "Emerging Symbio between Chemical Engineering other Disciplines" on Wednesday, 2 March 1990 at 5 p.m. and "Break of Drops in Turbulent Stirred Dis sions" on Thursday, 22nd March 1 at 3 p.m. Venue: Old Auditorium, U versity Department of Chemical Te nology, Matunga, Bombay 400 0 Professor M.M. Sharma will pres over both the lectures. The lectures open to public.

'aution urged in comparing industrial raw materials

The National Council of Applied onomic Research (NCAER) has lled for caution in making comparins of substitutable industrial raw iterials, keeping in view the national rspectives. In a new report titled ter-Industry Comparisons', the coun made for the Indian Petrochemical rporation Ltd. (IPCL), NCAER said ough plastics had emerged as an induial raw material due to some of their operties being comparatively superior those of the conventional raw maters, the comparison of substitutable raw iterials should be done from the tional perspective.

The perspective, it said, is to be based such criteria as consumption of irce resources, namely, foreign change, energy and capital, and conbution to the national exchequer and neration of employment. While in veral end-uses, plastics are steadily placing the products manufactured herto with conventional raw materi like steel, aluminium, wood and jute, s is equally true of other competing iterials such as aluminium replacing el and wood, tetrapack replacing tin ates, the council said.

The council report said between 1977 d 1983 and between 1983 and 1988, plastic packaging industry in the untry registered an overall growth rate 164 per cent and 84 per cent respecely. The expected rapid growth in ure demand for plastics stems from anticipated high growth rates for ch end-uses as packing of pharmaaticals, cosmetics, processed foods, ticides and chemicals.

The demand also rises because of ter substitution of conventional packing like glass container by-products de of plastics due to various factors, e of them being that plastics are less pensive than the glass items. It said at though plastic sachets are costlier an glass bottles, dairy units are progrevely switching over to plastic sachets cause of the ease in transportation and storage in refrigerators. Further, problems associated with cleaning of bottles are absent and there is lesser cost in transport per unit of milk delivered.

The council report claimed that the soft drink manufacturers are looking for a better substitute to bottle, like PET (polyethylene tetraphthalate) bottles, because they are unbreakable and lighter, even if costlier by about 20 to 30 per cent in comparison to glass bottles. Dwelling on the use of plastic sheets, it said energy consumption per square metre area of a aluminium sheet is about 4.4 times more than the corresponding area of plastic sheet.

Besides, the plastic sheet adds 1.2 times more to the national exchequer and there is no outflow of foreign exchange in respect of plastic sheets. But the manufacture of one sq. metre area of aluminium sheet allows outflow of Rs. 3 as foreign exchange. On plastic tanks for storage of water, the councilsaid the sale price per litre of overhead capacity in respect of galvanised mild steel is higher than that of plastic overhead tanks. Besides, the overall energy consumed per litre of galvanised mild steel tanks is nearly 10 times the energy consumed for the corresponding capacity of plastic tanks.

According to the report, the cabinet in a majority of television sets (both black and white and colour), is now made of plastic instead of hard board or wood because of the superiority of strength of plastic cabinet desired to be commensurate with the cost of the set. In the field of household furniture, plastics have failed to make any noticeable dent, the council report said. It said a product development programme must be launched to convince manufacturers of the utility of plastics as a structural material in substitution of metals. Engineering plastics are considered to be viable alternatives to metallic structure in furniture, it said.

PETROLEUM PRODUCTS

Import bill may touch Rs. 8000 crore mark

The year 1990-91 will see an colossal import bill of Rs. 8,000 crores on petroleum products to meet the gap between demand and supply. Stating this at a press conference, Mr. M.S. Gurupadaswamy, Minister of Petroleum and Chemicals, stressed the need for conservancy measures to arrest the disturbing trend of high consumption rates.

The present capacity is around 52 million tonnes against which the availability is around 33 million tonnes. The demand by the end of Eighth Plan would increase to 77 million tonnes and by the turn of the century to 101 million tonnes. As against which the additional capacity will be insignificant. All this will mean a growing strain on the foreign exchange and therefore the nation has to think in terms of conservancy measures.

To a pointed question whether it would also mean an increase in the prices of petroleum products in the near future, the minister parried it saying "you cannot take me for a ride".

From the guarded replies he gave to a spate of questions on the much awaited multicrore aromatics project mini-refinery at Tanjore to make optimum use of of the Narimanam crude, it would appear that neither of the projects has yet been cleared by the Planning Commission. Although at one state he stated that as the nodal agency his ministry had cleared the aromatics project, in his subsequent replies he gave the impression of a non-starter for the project.

Mr. Gurupadaswamy assured that exploration in the Cauvery and Krishna basin will be intensified in the near future and he hoped that luck would be on his side.

He added that he had already floated a plan of piped supply of LPG between Bombay and Delhi which if implemented would ease the LPG supply position to other parts of the country. Earlier inaugurating the R & D complex of MRL, Mr. Gurupadaswamy stated that he would endeavour to see that Central investment to Tamil Nadu was increased and that a favourable decision was taken on other projects.

ONGC PLANS HORIZONTAL DRILLING IN N. GUJARAT

As a part of its plan to introduce the latest technology in its drilling operations, Oil and Natural Gas Commission has decided to drill two horizontal wells at Balol and Lanwa fields in north Gujarat. The Balol and Lanwa fields form a part of the heavy oil belt in North Gujarat. The oil is highly viscous, unlike the light oil produced from South Gujarat. Development of the heavy oil belt is being carried out by ONGC. The development drilling is yet to be completed.

The fields, according to official sources, are to be developed through drilling of 221 wells in Balol and 154 wells in Lanwa. Even though initially, it was envisaged to drill some directional wells by adopting cluster techniques. Cluster drilling is an innovative technique to counter the problems of land acquisition and saving on civil construction.

This heavy oil is not only difficult to produce through vertical drilling but also in the conventional drilling a lot of water is also produced along with oil. A task force was formed comprising representatives from the ONGC's Institute of Reservoir Studies, Institute of Drilling Technology and the Institute of Oil and Gas Production Technology.

The task force has recommended the drilling of horizontal wells at Balol and Lanwa. Each of these horizontal wells can replace four vertical wells. The productivity increase is estimated to be six to eight times as much as the conventional vertical wells.

All over the world attention has now been focussed on gaining expertise in horizontal drilling. It can dramatically boost the field's oil production and ultimately the profits. Horizontal drilling is used for exploiting reservoir which would otherwise be non economical. It is not only used for improving recovery from the reservoir but also in reaching remote targets. Sometimes it can also be utilised for assessing the reservoir performance.

As in conventional methods, in horizontal drilling, the well is drilled straight down, often for several thousand metres. The drill pipe then slowly curves 85-90 degrees, which lets a driller tap more of oil. It is a high technology area as it requires the use of latest and sophisticated tools such as measurement while drilling system, steerable mud motors, inverted drill string and drill pipe assisted logging system.

A horizontal well can also penetrate more of the oil field's vertical fractures in a rock formation. A horizontal well can cost slightly more than a conventional well, but can produce four times as much oil. But recently, a Norwegian company claims to have achieved a breakthrough in cutting costs in the [illegible] field in the North Sea by a new technique of horizontal drilling.

ONGC has already gained the necessary experience in drilling horizontal wells in the Bombay offshore region. It has been able to drill through indigenous expertise seven horizontal wells. Horizontal drilling is also considered appropriate for producing from thin oil zones.

During 1990-91 four horizontal wells are planned to be drilled one each in [illegible] Panna and South Bassein field and [illegible] at Bombay High. Horizontal drilling is also being planned to be taken up in the prospective Khoraghat area in the north-east.

GC plans to spend Rs. 12,000 crores in western offshore

: Oil and Natural Gas Commission C) has estimated an outlay of Rs. 12,000 crores for various pro- n the western offshore area to be mented over the next five years. projects involving an outlay of Rs. 5,500 crores have already inalised and submitted to the gov- nt. These include the development Neelam, Mukta, Panna, mid-Tapti outh Tapti oil fields, the southern of the Western Offshore Integrated opment Plan (WOIDP), and a gas heme at Bombay High.

th these, ONGC is likely to float st 13 major tenders for supply of ment and construction jobs over ming six months, according to oil try sources in Bombay. These le retendering for a process plat- complex in the Panna field, other complexes in the Tapti, Mukta and bay High oilfields, well platforms water injection process platforms.

current prices, process platforms cost anywhere between $100 to million each, while well platforms price tags of around $30 million. r injection process platforms, help maintain or increase pres- levels in oil wells, and thereby nce yields, cost around $60 million each. The Panna oilfield, for the development of which an outlay of Rs. 1,149 crores is envisaged, has an estimated geological resource potential of 85 million tonnes. With eight well platforms, 69 development wells and an oil-gas processing platforms complex among other facilities, this field is expected to yield about 1.6 million tonnes of oil annually, at peak production levels.

The gas lift scheme at Bombay High, with an estimated outlay of Rs. 561 crores for the installation of a gas lift platform, laying of the pipeline network and the drilling of 67 wells, is expected to increase production by nearly 50 million tonnes during the period up to 2000 A.D. Work on the pipeline network, for which a contract has been awarded to a combine of Saipem and Snamprogetti of Italy, is likely to begin next month.

The WOIDP project, with a revised outlay of Rs. 388 crores involves the laying of trunk pipelines between the ICP platform and the Heera complex. This will help the utilisation of surplus gas of two million cubic metres a day, and also offer an alternative route for supply of oil and gas to the Uran facilities of ONGC. The mid and south Tapti fields, which are to be developed at Rs. 802 crores, will enable the supply of 3.5 million cubic metres of gas a day to the 300 mw power plant at Pipavav. The Mukta field, with a development outlay of Rs. 1,046 crores, is expected to achieve a peak production of 2 million tonnes of oil annually, and 1.4 million cubic metres of associated gas every day.

The most promising of all is the Neelam field, which is expected to account for the bulk of the production increase during the Eighth Plan period, with a production potential of four to six million tonnes annually. This field, which has two oil bearing offshore structures, has been earmarked for an outlay of Rs. 1,530 crores.

Besides the above projects, ONGC is currently working on several others estimated at Rs. 4,000 crores. These include the development of the L-II and L-III sands in Bombay High, the thin oil rim of south Bassein, and the south Bassein-Hazira pipeline. ONGC's agenda also has projects for the development of about eight other structures in western offshore with an estimated outlay of Rs. 1,820 crores.

While all these will help ONGC achieve the targeted oil production level of over 30 million tonnes by the end of the Eighth Plan period, oil industry circles are doubtful of the timely implementation of the projects. They point to

delays in awarding contracts or floating tenders for several projects such as the WOIDP and gas lift pipeline systems, the installation of an early production system and the development of Ratna oilfield.

For instance, the tender for early production system had been floated and closed several months ago, but nobody was willing to hazard a guess as to when the contract would be awarded. Already, ONGC has asked for an extension of the validity of the bids offered.

The opening of the WOIDP pipeline tender, which was originally scheduled for December 20 last year, has now been postponed. Oil industry sources expect a delay of at least two months before work on thelaying of pipelines for the project can begin.

For offshore construction projects, it is critical to complete all preliminaries including delivery of equipment before the monsoon ends. This is because almost no construction work can be carried out during the five monsoon months between May 15 and Oct. 15.

The Ratna oilfield, for which the opening of tender bids for supply of about $15 million worth of seamless pipes was originally slated for January 9, appears to be undergoing fresh scrutiny. Bidders have been told that the opening of tenders has been postponed indefinitely.

ONGC sources in Delhi and Bombay say that much of the delays are on account of slippages in clearing proposals by various government departments and agencies, including the petroleum and finance ministries. They cite examples of projects where environmental clearances were being duplicated, where more than one project would use the same facilities.

Meanwhile, it is understood that the Petroleum Ministry and the Pla Commission are reviewing al Eighth Plan proposals, which is responsible for some of the dela implementation. Currently, firm grammes are being cleared only f first year of the plan period, source

BENGAL OUTLAY MAY BE RAISED TO COVER HALDI

The West Bengal government' outlay for Haldia Petrochemic 1990-91 is likely to be raised to R crores to cover the larger contrib it was to make to the equity for th ject. The state's Rs. 1,328 crore proposals which were approved b Planning Commission rec included only a token outlay of crore "pending finalisation of th ject". Now that the state govern has decided to go ahead with th ject with the Tatas, the proces started for mobilising funds from departmental allocations. Source that mobilisation of funds for th ject would not be much of a pro This would be possible in spite fact that the Planning Commissio cut Rs. 50 crores from the or Rs. 1,378 crores presented by the

However, the state is not too un with the plan proposals that had approved by the Planning Comm It is confident that the inter-d mental re-allocation for going with the Haldia project will ha commission's approval. The tran equity shares from the original p of the Haldia project — RPG Ent — to the new partners — the Ta is likely to take some time. Th government is not too sure amount RPG will demand for the transfer. The process of format other joint sector companies f downstream projects is in progr joint-sector company with Mit Ispat group is already within th government's purview. The projec tals are expected to get are for s butadiene rubber (SBR) and aro

A rapid wrap-up of what's new in Operations, Processes and Products

ıylcyclohexene (VCH) from acetophenone (AcP)

P can be hydrogenated to methyl cyclohexyl carbi- which on dehydration gives VCH. The yield of VCH, 8% conversion, is around 55-60%; ethylidene cyclo-ane is formed to the extent of about 7% and methyl lohexyl ketone upto 33-38%. VCH can be used for t resistant resins. (*Chem. Abstr.* 1989, **111,** 214967).

enylated diphenyl diisocyanates for modified ure-nes

Products have claimed that 4,4'-methylene dianiline be alkylated with dicyclopentadiene and then phos-ated. (E.P. 311,902, April 1989; E.P. 311,901; E.P. ,899; *Chem. Abstr.* 1989, **111,** 215068, -69, -70).

new phenolic material for polycarbonates (PC)

mitsu have claimed that *o*-cyclohexyl phenol can be densed with dichlorodiphenyl methane to give a spe- bisphenol which can be converted to PC. (*Chem. str.* 1989, **111,** 215076).

ective hydrogenation to give nerol, geraniol etc.

one-Poulenc have claimed that, for instance, Citral, $Cl_3.3H_2O$, *tris* (m-sulfophenyl) phosphine, in a mix- of buffer solution at pH 7 and toluene, when hydro-ated at 50°C and 50 atm. gives 94% nerol and aniol. (E.P. 320,339, June 1989; *Chem. Abstr.* 1989, , 232078).

ective *para*-halogenation of benzene

on Corporation of Japan have claimed that chlori-ion in the presence of potash feldspar or leucite or olite gives the *para* derivative in high yields. (*Chem. r.* 1989, **111,** 232260, 2322612 and 2322264).

PARATIONS

r water strippers

et al., have used a process simulator to evaluate dif-nt configurations for steam stripping of waste water uent from ammonia-urea plants. With a new heat gration scheme stripper capacity was increased by % even though steam flow was drastically reduced. *drocarbon Processing*, 1989, August, p. 65).

Impact of utility costs on pinch designs

Ranade **et al.** have shown that slightly different utility costs can change significantly optimum heat exchanger network designs and heat intergration project schemes. (*Hydrocarbon Processing*, 1989, July, p. 39).

Ceramic, metallic devices extend membrane separation technology

We have frequently referred to the fast developing subject of membrane separations in this column. Now ceramic and metallic membranes are attracting attention as the fluids can then be processed hot. Du Pont has recently come out with an advanced composite membrane for treatment for brackish water. Du Pont's ceramic membrane (PRD-86) is composed of porous, hollow ceramic tubes spirally wound to form self-supporting cylindrical unit. Alumina, mullite, coordirite, or combinations can be used as ceramic material; pore diameter is controllable between 0.06 and 1 micron. For water, liquid flux rate can be in the range of 40 to 80 litres/day per 0.07 atm pressure. Temperature can be as high as 1300°C. This membrane should be useful for microfiltration area, including biotechnology.

Powder-metal membranes, primarily stainless steel are now available and these are expected to be useful in processing of foods and pulp and paper industries. (*Chem. Eng. News*, 1989, 31, July, p. 34).

Microfiltration: Membranes based on carbon fibres

Ceramic membranes are commercially used and even sterilization of membranes can be carried out. Now Le Carbone has introduced a carbon membrane on a carbon fibre substrate which can work upto temperatures of 180°C and since it is based on fibres it can stand high pressures. Carbon provides, like graphite, high corrosion resistance. (*Chem. Engr.*, Instn. Chem. Engrs., U.K. 1989, Nov., p. 13).

Electrostatic plastic heat exchanger (EPHE)

TNO (The Netherlands) has introduced a new design of EPHE which consists of a series of corrosion resistant tubes mounted either vertically or horizontally. It has been designed to recover heat of hot flue gases which are emitted at present at 120°C and can be used to heat water and condensate which is corrosive can be handied.

The tube walls also contain a conductive component so that a high electric voltage can be applied and thus dust collection can be efficiently done. (*ibid*, p. 30).

Removal of formaldehyde at low concentrations from aqueous solutions

BASF have claimed that low concentrations of HCHO, which may influence subsequent reaction/use of the main product, e.g. in butynediol, can be removed via acetal formation with, say methanol using zeolites and acidic ion exchange resins as catalyst. The acetal (methylyl in this case) can be removed by distillation. (E.P. 309,915 of April 1989, *Chem. Abstr.* 1989, **111**, 194103).

Recovery of *o*-cresol/2,6-xylenol/phenol from aqueous solutions

Asahi Chem. Ind., has claimed that activated carbon can be used to adsorb the named phenolic substances. A key feature is that desorption can be done with methanol. In a 2,6-xylenol plant the desorbed product can be mixed with the feed. (*Chem. Abstr.* 1989, **111**, 232293; 232294).

Clay minerals as selective and shape-selective sorbents

R.M. Barrer, who did pioneering work in zeolites, has given a state-of-the-art review of this subject in two different publications. The review covers non-porous sorbents and microporous shape-selective sorbents, derived from palygorskite, spectite, and vermiculite. Cation exchanged and pillard clays are now acquiring importance as shape selective sorption is possible (and in conducting reactions selectivity can be improved). (*Clay and Clay Minerals*, 1989, **37**, No. 5, 385-395; *Pure and Applied Chem.*, 1989, No. 11, 1903-1912).

Structure and properties of porous hypercrosslinked polystyrene sorbents "styrosorb"

Davankov and Tsyurupa have developed 'Styrosorb' based on cross-linking of high mol. wt. polystyrene chains in solution or in a highly swollen state. Bifunctional reagents such as 4,4-bis-(chloromethyl) biphenyl (CMB), *p*-xylidene dichloride, dimethyl formal, etc. Linear atactic polystyrene with a mol. wt of 300,000 was used. This crosslinked polymer is highly porous even in dry state and gives areas of 1000-1,300 m^2/g. Both small and large molecules can be adsorbed. For organic vapours styrosorb appears to be particularly good. This adsorbent can also be used to recover some chemicals from waste streams. (*Pure and Applied Chem.*, 1989, **61**, No. 11, 1881).

Esters of dicyclopentadiene (DCPD)

Huls have claimed that strongly acidic ion exchan resins like Lewatit SPC 108 catalyse the reaction betwe DCPD and acids like acetic acid at temperatures of 1(to 140°C. It is preferable to have a small amount of wat Vacuum distillation of the esters should preferably carried out in the presence of a small amount of ace anhydride. (Ger. Offen 3,619,797; *Chem. Abstr.* 19 **110**, 153785).

Ultrasound (US) in organic synthesis

We have covered in this column the beneficial role US in organic synthesis. US in the range of 20-100 K frequency is very useful. A brief report has recen apeared in *Performance Chemicals* (D. Walton, 1989/ Dec./Jan. p. 42). Ullmann-Goldberg synthesis of N-a anthranilic acid, Michael addition of chalcone with d thyl malonate etc. have shown pronounced effects of U Sonoelectrochemistry is now attracting attention.

Phase Transfer Catalysis (PTC) in ethoxylation nonyl phenol

Wesslen et al. have shown that this reaction at 130 and 2 atm. (abs) pressure, catalysed by alkali me hydroxides, is amenable to intensification with PTC l 18-crown-6 and tetramethyl ethylene diamine. (*J. Am Oil Chem. Soc.* 1989, **66**, No. 8, p. 1107).

Ion Exchange Resins (IER) clays/zeolites as cataly Hydration of isoamylenes and isobutylene

Erdolchemie (of W. Germany) has claimed that t hydration reaction is best carried out near the boil point of isoamylenes and isobutylene at appropriate pr sure, the use of SPC 118 cationic IER is referred. (G Offen 3,801,273 and 3,801,275 of July 1989; *Ch Abstr.* 1990, **112**, 7031 and 7032).

Isomerization of by-products of Bisphenol A

Shell has claimed that cationic IER like DOW MEC-1, containing 10%, $(HS\ CH_2CH_2)_2\ NH$ at 80 allow by products of Bisphenol A to be isomerised bisphenol A. (Eur. Pat. Appd. 313,165, April 19 *Chem. Abstr.* 1990, **112**, 7156).

In a related paper General Electric have claimed that I catalyst used for making Bisphenol A can be reger ated with 5% NaOH followed by treatment with 2. H_2SO_4. (Eur. Pat. Appl. 324,080, July 1989; *Ch Abstr.* 1989, **11**, 233860).

4,4-Dihydroxy diphenylmethane (DHDPM)

Mitsubishi have claimed that activated clay works as a good catalyst at 80°C for the reaction between phenol and formaldehyde. (Eur. Pat. Appl. 331,173, Sep. 1989; *Chem. Abstr.* 1990, **112,** 7160.

Aziridines from aminoalcohols

Union Carbide have claimed that a Cs-loaded $AlPO_4$-11 molecular sieve allows monoethanolamine to be converted to aziridine at 375°C. (PET Int. Appl. No. 8905797, June 1989; *Chem. Abstr.* 1990, **112,** 9005).

4,4-Diisopropyldiphenyl (DIPDP)

Dow have claimed that mordenite zeolites, with a high proportion of mesopores, allow *liquid phase* alkylation of biphenyl with propylene to give DIPDP in high (more than 70%) yield. (Lee, G.S. **et al.** *Catalysis Lett.* 1989, **2,** (4), 243).

Hydroxylating phenols

Rhone-Poulenc have claimed that the reaction between phenols, PhOR, and RC_6H_4OR with H_2O_2, in the presence of pillared clays gives good selectivity. Thus PhOH dissolved in MIBK, reacts with 70% H_2O_2 at 80°C to give 33% catechol and 62% hydroquinone. (E.P. Appl. 299,893, Jan. 1989; *Chem. Abstr.* 1990, **112,** 7155).

Asymmetric reduction of carbonyl compounds

Ajinomoto (of Japan) have claimed that $R'CO(CH_2)_n COOR^2$ can be subjected to asymmetric reduction with sodium borohydride, in the presence of an optically active tartaric acid or its ester, to give the corresponding optically active hydroxy compound. Asymmetric reduction of $MeCOCH_2COOEt$ is reported with 81% optical yields. (E.P. Appl. 320,096, June 1989; *Chem. Abstr.* 1990, **112,** 7046).

Extractive condensation of *o*-tert butyl phenol (OTBP) with HCHO

OTBP reacts with aq. HCHO is a two-phase system to give a pure bisphenol. The reactant phase allows $CH_2(OH)_2$ to be extracted. (A USSR publication; *Chem. Abstr.* 1990, **112,** 7110).

***o*-Nitrophenetole (ONP)**

Hoechst have claimed that ethoxylation of orthonitrochlorobenzene can be carried out with ethanol in 40-70% aq. NaOH, at 65-70°C, in the presence of a PTC like tetrabutylammonium bromide. (Ger. Offen. 3,737,919 of May 1989; *Chem. Abstr.* 1990, **112,** 7158).

Reaction between phosphine and aqueous HCHO

Harrison **et al.** have shown that Pt and Ni-$P(CH_2OH)_3$ ligand, which is a product of the reaction, catalyses the reaction under reference. (Harrison K.N. **et al.,** *J. Chem. Soc. Chem. Commun.* 1989, (16), 1096).

Reaction between hydroquinone and aniline/substituted anilines: Use of sulphur-promoted superacidic zirconia

Kumbhar and Yadav have shown how the reaction under reference can be carried out with reusable and easily filterable catalysts rather than with polluting catalysts like *para*-toluene sulphonic acid. (*Chem. Eng. Sci.* 1989, **44,** 2535).

Absorption of CO_2 in aqueous solutions of alkanolamines and potash

Van Swaaij **et al.** (from Twente Univ., The Netherlands) have carried out extensive studies on the subject which has included the use of hindered amines and potash solutions activated with alkanolamines like diethanolamine, 2-amino-2-methyl propanol, 2-piperedinethanol. A rigorous theoretical backup is provided and the agreement between theory and experiments appears to be good. (*Chem. Eng. Sci.* 1989, **44,** 2723, 2735, 2745).

In a related context the use of chemical methods for the determination of interfacial areas in gas-liquid contactors has been studied by Westertep and co-workers. The effect of pressure on interfacial area is negligible above the critical speed of impeller in mechanically agitated contactors. (See e.g. *Chem. Eng. Sci.* 1989, **44,** 2691).

Spout and Spout-fluidised beds for grain drying

Passos, Majumdar and Raghavan have shown that conical-cylindrical spouted bed dryers and spout-fluid bed dryers are quite efficient for grains like rice, corn and wheat. A PC-programme has been developed. *(Drying Technology,* 1989, **7,** (4), 663).

Phenol to cyclohexanone

Johnson-Mathey and Montedipe have jointly developed a new catalytic process for one-step conversion of phenol to cyclohexanone using a Pd/Al_2O_3 catalyst. The cyclohexanol production is only about 3.5% of -one. This one-step process is distinctly superior to the two-step process which involves conversion of phenol to cyclohexanol with Ni catalyst and subsequent dehydrogenation with Zn catalyst. (Dodgson, J. **et al.,** *Chem. Ind.* 1989, No. 24, 18, Dec. p. 830).

Direct oxidation of propylene (P) to propylene oxide (PO)

Olin Corp. have developed a new process for PO which involves direct oxidation of P in a molten bath of alkali and alkaline earth nitrates. The O_2 to P ratio is claimed to be around 120. Perhaps a catalyst based on Pd is used. (*ECN*, 1990, 22 Jan., p. 15).

Emulsion polymerization of acrylonitrile (AN) and alpha-methylstyrene (AMS)

Bayer have claimed that co-polymers with 30% AN and 70% AMS are useful in blends with good resistance to heat, discolouration and fogging and are prepared suitably through emulsion polymerization. (Gen. Offen 3,807,233, Sept. 1989, *Chem. Abstr.* 1990, **112,** 8058).

Continuous polymerisation in a packed pulsating column (PPC)

Stamicarbon have claimed that PPC give good polymer characteristics via emulsion polymerization (e.g. of styrene). (*Chem. Abstr.* 1990, **112,** 8063).

Hydroformylation

Arhancet **et al.** have discussed the use of water soluble Rh phosphine ligands to carry out the hydroformylation (oxo) reaction in liquid-liquid system. Selectivity can be manipulated to some extent due to two liquid phases. In the case of 1-octene the ratio of linear to branched products was 1.8 to 2.9. (*Nature*, 1989, No. **339,** 454).

Pitfalls in reactor design

Hooper has given a simple but effective account of pitfalls in reactor design, with some examples. In particular this article is directed towards unexpected flow patterns and mixing limitations. The example of a 3 m dia. fluid bed reactor for oxidation is referred. Backmixing in the gas phase is nearly negligible. The bed is not equivalent to a CSTR. Another example referred to is that of a loop reactor with the loop pipe more than 30 cm in dia. The reactor was originally thought to be a CSTR but the actual results did not tally with this model. Prediction of true RTD is still an important problem. (*Chemtech*, 1990, January, p. 54).

Polypropylene (PP) bank notes

PP bank notes based on BOPP film with heavy printing and having a halogram and clear 'window' for security, has been introduced in Australia through a ten dollar note. This holds a lot of promise and may be later used in bonds, securities, etc. (*Shell Petrochemicals*, 1989, No. 11, p. 22).

Surface polymers for sports

Synthetic turf is making a big impact in the world of sports for hockey, tennis, etc. Polymeric surfaces are being laid in childrens playground; the driving force is the public anxiety over the safety of children in playgrounds. (*Shell Petrochemicals*, 1989, No. 11, p. 20).

Supercritical fluids

Extraction of lignin from wood with supercritical alcohols.

Reyes **et al.** have examined extraction of lignin from samples of white fir sapwood with supercritical *t*-butanol and isopropanol. It is clear that the extent of extraction is far superior under supercritical *vs.* sub-critical conditions. (*The J. of Supercritical Fluids*, 1989, **2,** p. 80).

Reverse micelles and microemulsions in near-critical and supercritical fluids

Smith **et al.** have shown that reverse micelles and water-in-oil (W/O) microemulsion phases can be formed in the near-critical and supercritical fluids and this provides a unique opportunity of realising variations in phase behaviour with pressure.

AOT -- C_2H_6/C_3H_8/Xenon -- water systems were studied. These systems can be used to efficiently extract hydrophillic substances, including proteins, from dilute aqueous solutions. (*J. Phys. Chem.* 1990, **94,** 781).

N-Alkylanilines

Bayer has claimed that anilines can be N-alkylated with alcohols or dialkyl ethers with pentasil-type zeolites. Further N-alkyl anilines can be made from aniline and N,N-dialkylaniline with ZSM-5 type zeolite (Ger. Offen DE, 3,803,661 and 3,803,662, *Cf. Chem. Abstr.* 1980 **112,** 35426 and 35425).

Monoterpene ethers: Zeolites as catalyst

It has been claimed by a Chinese Institute that the addition reaction of monoterpenes with alcohols can be carried out with Mordenite catalysts giving over 90% yiel and 90-100% etherification. Thus alpha-pinene and ethanol (more ratio 1:10) at 78°C gave 45% alpha-terpeny ethyl ether and 25% bornyl ether ether with 100% conversion. (*Chem. Abstr.* 1989, **110,** 231928).

OIL EXPLORATION IN BENGAL BASIN

Success eludes ONGC

West Bengal Chief Minister, Mr. Jyoti Basu has emphasised the need for clearing doubts that have gathered over the efficacy of oil exploration work in the Bengal Basin. Addressing a national seminar on prospects of mineral oil exploration with special reference to the Bengal basin, the Chief Minister regretted that although exploration activities in the state had been going on for over 40 years nothing had been achieved so far. This, he pointed out, had led a section of scientists to believe that not enough was being done to explore the area properly. The doubt is all the more because like all deltaic regions, the Bengal basin too was considered geologically favourable for generation and accumulation of hydrocarbons, he said.

"I am not an expert on the subject but I have been told that the present state of exploration work in the state leaves much to be desired", he said, adding, "the drilling density here is barely three per 10,000 sq. kms. against the all India average of 11.6 and a much higher international average. "We are so vitally concerned about the prospect of oil in this part of the country", he said.

Mr. M.S. Gurupadaswamy, Union Minister for Petroleum and Chemicals, who inaugurated the seminar, made it clear that there was no question of either stopping or slowing down or even paying less attention to exploration work in the Bengal basin. "My endeavour will be not only to intensify exploration activities but also to make proper use of the available data for the benefit of the state". "Let the 1990s be the decade of breakthrough in oil exploration in the Bengal basin" he said. He assured that money would not be a problem. The minister, however, felt that in view of country's limited resources, exploration strategies should be evolved in the most cost-effective manner. In the Seventh Plan the crude production increased marginally. "The achievements of the Sixth Plan were not repeated in the Seventh Plan", he said.

Mr. S.K. Magalik, member (technical), Oil and Natural Gas Commission (ONGC), while tracing the history of exploration in the state, said that exploration effort had been extended to north Bengal to test the possible paleogene objectives there but with little success so far. The exploratory results, even though far from encouraging yielded useful information which had been debated in open forums and brainstorming sessions from time to time to encourage fresh thinking on the subject.

Dr. B.D. Nag Chowdhury, an eminent scientist who presided over the seminar, said the need for stepping up exploration in Bengal was imperative. He also expressed the apprehension that not enough data was made available publicly for proper analysis and scrutiny. He felt more and more public knowledge of what was actually happening would help clear the doubts over the efficacy of exploration work.

INDO-USSR TIE-UP IN OIL, GAS

A new Indo-Soviet joint venture has been set up in the Soviet Union designed to help oil and gas prospecting. Called "eloilgeo', the joint venture will be engaged in the development and manufacture of automated working stations to process geophysical information for geological prospecting, said a member of the Eloilgeo Board and geological expert, Mr. Vladimir Levyant. In effect, it would mean the development of a new generation of processing and interpreting systems enabling specialists to obtain more accurate and reliable geological results from available factual data.

In practice it would result in a substantial rise in the effectiveness of prospect boring, he said. Mr. Levyant pointed out that at present out of every three exploratory boreholes only one yielded oil or gas, or a little over 30 per cent probability of success. With the help of the systems to be developed by the joint venture, the probability of success could be raised to 50 per cent.

The joint venture would have good prospects, he said, since both the Soviet Union and India were engaged in large scale oil and gas prospecting. "Besides, our systems can be used not only in prospecting but also in the exploitation of oil and gas fields for analysing the production and geophysical conditions".

The demand of the two countries for the products of the joint venture would run into thousands, according to the Soviet expert.

ONGC TO INVEST Rs. 743 CRORE IN TRIPURA

The Oil and Natural Gas Commission would invest Rs. 743 crores in Tripura during the Eighth Plan, according to Mr. J. Swarup, General Manager of the Commission's Tripura project. Mr. Swarup and other senior officials said, ONGC proposes to drill another 44 exploratory wells in various structures in the State.

Exploratory drilling in Tripura was initiated in 1972 on the Baramura anticline. So far 45 wells ahve been drilled. The deepest well, Rokhia-I was drilled up to a depth of 4600 metres. The total quantum of natural gas expected to be struck by the end of 1995-96 would be six million cubic metres per day.

However, in the absence of adequate industrialisation the Commission did not think it proper to enhance the number of rigs from its existing fleet of seven, Mr. Swarup said. Even with the 'highly ambitious' gas-based schemes put forward by the State Government and to be taken up during the Eighth Plan, the quantum of consumption of gas would be of the order of 3.5 million cubic metres per day.

Insecticides Act may be amended

The Central Insecticides Board (CIB) has revived the proposal to amend Section 9 (3) of the Central Insecticides Act aimed at giving five years' protection to the first registrant of any new chemical. This is one of the several amendments to the Act recommended by CIB. When the proposal was first mooted in March 1986, it was welcomed by all multinational pesticide manufacturers. The Government was forced to drop the amendment move following an outcry from formulators and consumer groups. Five years of protection, they had argued, was as good as "introduction of patent through the backdoor".

The Ministry of Agriculture has now started conducting separate meetings with various associations and groups who have filed objections to the proposed amendments. The ministry also proposes to conduct a two-day brainstorm workshop for changes in the Act at Hyderabad in February end or March.

The proposed amendment will grant rights equivalent to patent rights to companies introducing new insecticides products. Such an amendment to Section 9 (3) will indirectly amend the existing Section 9 (4), dealing with repeat registrations by other parties who seek to introduce the same product. The amendment proposes to give a five-year right to exclusive use of toxicity data in respect of new pesticides proposed for registration, so that it cannot be used to support registration of the product by others wishing to manufacture or import the same.

This will require every new applicant for registration to generate its own data by conducting experiments on live animals. By administering the toxic insecticide to laboratory animals like rats, guinea pigs, dogs and fish, data on lethal dosage and the rate at which animals die are generated. In other words, every new applicant will have to kill animals to generate the same data.

Formulators in the small sector have protested that this is a patently absurd situation. Toxicity data generated by experiments on animals should be public property and not exploited for private business purposes. "In any case, data which are not exposed to the scrutiny of scientific community by publication in scientific journals should be treated as suspect when they are preferred as proprietory data in support of a commercial proposition", the Pesticides Formulators' Association of India (PFAI) has written to the Government. On the need to kill and torture more animals to generate data to support each fresh registration, the association asked: "Does the animal kingdom exist for such wasteful and useless generation of data?"

The legal validity of the proposed change is also suspect. The Insecticid Act has the limited purpose of regula ing the transport, manufacture, etc. insecticides with a view to prevent ris to human beings and animals. The ne provision of restricting registratic under Section 9 (4) will not come withi the objects of the Act as set out in i preamble.

The Government move is motivat by the belief that new pesticides are n introduced in India by multinationa and large-scale units in the absence protection. This, by all accounts, untrue. If there is a potential market f any pesticide, nothing can prevent the introduction in India by these comp nies.

When synthetic pyrethroids like fe valerate and cypermethrin were giv provisional registration during 1982- under Section 9 (3) (b), price of fenval rate 20 per cent EC ranged fro Rs. 500 to Rs. 600 per litre and fenval rate technical at Rs. 1,000 a kg. Duri 1983-84, more than five registratio were issued to medium and small un under Section 9 (4), with the result th prices came down dramatically. Fenv lerate 20 per cent EC came down Rs. 400 per litre and fenvalerate tec nical Rs. 850 a Kg. Thanks to mo entrants the prices are ruling at Rs. 2 per litre for fenvalerate 20 per cent E and Rs. 635 for the technical grac This is also true of cypermethrin a other products.

HLL process for bioinsecticide

Hindustan Lever Research Centre has evolved a process to produce bacillus thuringiensis israelensis (BTI), a bioinsecticide, using molasses culture, it is learnt. The process is yet to be tried out on a commercial scale, according to industry sources.

BTI was first isolated in 1977 from a polluted pond in Negev desert by Joel Goldberg and Joseph Margalit of Hebrew University of Jerusalem. This bacterium has been found effective in fighting mosquitoes and black flies. Many believe that BTI can be used commercially to combat the resurgence of malaria in India and other tropical countries.

BTI is one of the earliest means of biological pest control. BTI-based non-toxic, biodegradable insecticides were introduced in United States in the 1950s; and are sold in several countries today. Well-known pharmaceutical companies of the west are marketing their own brands of BTI: Dipel (Abbot); Bactospeine (Biochem); Thuricide (Sandoz); SOK-BT (Upjohn) and Tribactur (Pennwalt).

Hindustan Lever's corporate communications department declined to provide information on the subject and turned down a request to interview scientists at the research and development centre, perhaps in view of alleged reports in some quarters that its personnel have been involved in clandestine transfer of germplasms from and to other countries.

However, it is understood that Lever scientists have successfully tested BTI spores on insects affecting cotton, maize, cabbage, sunflower, pigeonpea and safflower. Worldwide, the bulk of BTI is used to control insects affecting lettuce, cabbage and tobacco. It is registered for use against 90 insects.

The bioinsecticide market constitutes about five per cent of the $1 billion global insecticide market. World production is only around three to four thousand tonnes.

However, there is a growing preference for them as they are non-toxic and biodegradable. Unlike chemicals, however, they act slowly. Another limiting factor is that there are no bioinsecticides for a large number of menacing pests.

AMINSONS

Aminsons Ltd., an export-oriented company, is pursuing an expansion programme aimed at doubling its manufacturing capacity for chrome leather and also diversifying into production of tanned soles and harnesses. To finance partly the capital expenditure involved, the company will shortly be making an issue of 20 lakh equity shares of Rs. 10 each at a premium of Rs. 5 per share. CCI consent for the issue has already been received.

Out of the aggregate issue, the company proposes to reserve 3.75 lakh equity shares with an issue price of Rs. 56.25 lakhs for preferential allotment to shareholders of Super House Ltd. The issue is expected to open in early March 1990.

In the current year, the company has been faring well. During the six months ended September 1989, it achieved a turnover of Rs. 521.09 lakhs with an estimated net profit of Rs. 44.68 lakhs, compared to Rs. 345.55 lakhs and Rs. 28.96 lakhs respectively during the corresponding period last year.

The company is a well-established exporter of high quality leather, used in shoes, upholstery, garments, saddles and bags. Its product is being marketed in major countries of Europe and the Far East. The company is part of the Super House group which is among the largest manufacturers and exporters of leather products in North India.

The company already has export contracts worth over Rs. 10 crores on hand.

ONLY TWO PRE-SHIPMENT DOCUMENTS NECESSARY

Export forms simplified

The government announced on February 14, simplification of export documents to give the much-needed relief to exporters. Apart from other relaxations, exporters would now have to prepare only two master documents, instead of the present 25, relating to pre-shipment of export cargo.

The introduction of the simplified scheme relating to export documents will reduce the burden on the exporters and give a substantial push to the country's on-going export drive, a Commerce Ministry release said.

The adoption of the new documentation system is expected to enable the exporters to save at least 50 per cent of the time and cost presently spent by them on documentation. It will also help in expediting the decision-making process, virtually eliminate the chances of errors, and facilitate electronic transmission of documentation and data.

Immediately on his assumption of office, the Commerce Minister, Mr. Arun Nehru, had identified the simplification of export-related documentation and procedures as one of the key measures to promote exports.

Accordingly, simplification and standardisation of pre-shipment export documents was included as an item in the government's action plan which was announced on January 1, 1990. March 1, 1990 was the target date set for accomplishment of this task.

In pursuance of this objective, several meetings were held with representatives of trade and industry as well as various government agencies and departments involved. Comprehensive proposals regarding simplification and standardisation of pre-shipment documents have been drawn up and have just been approved by the government, the release said.

Currently, Indian exporters are required to submit about twentyfive documents to various agencies and authorities merely to ship the goods. Each document has to be individually prepared.

The new system has sought to standardise these documents and also to align them to each other, on the basis of the United Nations key which has been adopted by most of India's trade partners. Thus, instead of typing out 25 documents, an exporter would now have to prepare basically only two master documents.

The new system also includes simplification and relaxation of related procedures, which will further reduce the delays and time component currently involved in the export effort. It is expected that as a fall-out of the introduction of the new system, a self-propelling process towards further rationalisation of documentation and procedural requirements would be set in motion in all the concerned organisations.

And at the end of it, the exporter should be able to spend his resources and energy more on export production and marketing than on meeting the demands of archaic procedures, the official release said.

The simplification of pre-shipment documentation is only the first step. The post-shipment documentation and numerous procedures connected with clearance of import and export of goods, inspection, warehousing, bound operations, road haulage of import-export goods, operations at inland cargo depots are also important areas which call for rationalisation and simplification in keeping with the recognised international practices.

Co-ordinated efforts towards this broader objective will be pursued by the Commerce Ministry in the coming weeks and months, the release said.

PAYMENT OF EXCISE LEVY

SSI production upto Rs. 50 lakhs may be exempt

The Union government is likely to exempt from excise levy small-scale industries' production upto Rs. 50 lakhs, according to official sources. The move follows representation from a host of SSI units and associations from different parts of the country. This is also in line with the government's avowed intention of giving a boost to the SSI sector.

Many associations had sought exemption up to a production level of Rs. 1 crore during their pre-budget meeting with the Finance Minister. Officials, however, explain that this would obviously be an exaggerated level. Therefore, exemption up to Rs. 50 lakhs appears more practical if the inflation factor is also taken into account.

The proposed exemption is a part of the steps that the government plans to take to encourage the SSI sector. The other major proposal being considered in this regard is the raising of the investment limit on plant and machinery allowed to the SSI units. It is learnt that the limit will be doubled from the existing level of Rs. 35 lakhs.

In the 1986 budget, the small scale units had got an excise exemption of up to Rs. 15 lakh if their production was covered under any one heading of the Central Excise Tariff Act. The exemption was higher — Rs. 30 lakhs — if the production was under two heads.

However, in 1989-90 it was decided to allow the Rs. 30 lakh exemption only if the production was under two different chapters of the Act, and not under two different headings. With this change, the effective limit of ex exemption was reduced to Rs. 15 la

The SSI sector has been arguin along that production under two di ent chapters would not be feasible involves higher investment in plant machinery.

As regards the ceiling on invest limit, while the government is kee raise the same, it is also wonde whether the move would benefit the sector in general. This is because few SSI units would fall in the Rs lakh category in terms of investme plant and machinery. Against this number units with an investment r ing between Rs. 2 lakhs and R lakhs is higher. This is the seg which needs the maximum encour ment.

Another point which is being del relates to the need for classifying small units into three categories —

all and medium. This is because ny SSI industries have matured and wn beyond the limited definition of mall unit. They would be better off ng defined as medium scale units, it elt. Many SSI units have a huge turn- er and employ a sizeable number of rkers. The majority of these work- are on contract basis. So the actual rkforce is rarely defined. Sources at w Delhi point out that all these ects need to be studied thoroughly ore the government decides to raise ceiling limit. The idea is to benefit SSI sector per se and not a handful small units.

PORTS SLOW DOWN, PORT SURGE CONTINUES

n a continuing upsurge, India's orts in the first nine months of the rent financial year (April to ember 1989), have increased to a ord Rs. 19,254.85 crores from 13,926.68 crores in April- ember, 1988 showing a rise of 38.3 cent. In dollar terms also exports are ntaining a steady growth. During il-December, 1989 exports in dollar as are estimated at $11,649.41 mil- as against $9,803.52 million worth exports in April-December, 1988, ecting a growth of 18.8 per cent.

nports, on the other hand, have reg- ed a relatively slower growth during period in rupee as well as dollar s, an official press release said. ing the nine months from April to ember, 1989 India's imports unted to Rs. 24,773.30 crores com- to Rs. 20,528.38 crores during the esponding period of 1988, an ease of 20.7 per cent. In dollar , imports are estimated at $14,988 on as against $14,450.70 million an ease of only around 3.7 per cent.

s a result of the continued growth ports and slow down in imports, the nce of trade position has improved iderably, according to the provi- al data available from the Directorate General of Commercial Intelligence and Statistics (DGCI and S). The trade deficit has declined by 16.4 per cent in rupee terms from Rs. 6.601.70 crores in April-December, 1988 to Rs. 5,518.45 crores in April-December, 1989. In dollar terms, India's trade deficit has gone down by 28.2 per cent from $4,647.18 million in April-December, 1988 to $3,338.73 million in the first nine months of the current financial year.

LDPE: TATA TEA MAY TIE UP WITH SOVIET FIRM

The co-promoter of the Haldia Petrochemicals, Tata Tea Ltd., is expected to enter into a joint venture with a Soviet firm for manufacturing low density polyethylene (LDPE) and polyacetate engineering plastics as part of the Rs. 3,000-crore integrated petrochemical project. Addressing the members of the Indo-Soviet Chamber of Commerce at Calcutta, the USSR Ambassador to India, Mr. V.F. Isakov, said "Technochim, a firm from Leningrad, and an Indian partner are expected to start a joint venture for manufacturing LDPE and polyacetate engineering plastics. Mr. Isakov said the project might be attached to Haldia Petrochemical complex and export about 20 per cent of its engineering plastics to the USSR.

HC STAYS LEVY ON GUJCHEM

Gujarat High Court has stayed the 50 paise per litre levy on industrial alcohol by the State Government on Gujchem Distilleries. By granting the stay only for Gujchem, the High court has disappointed other alcohol-consuming units who will now have to file separate suits for getting similar stays.

It is strange that though several months have passed since the Supreme Court ruled that States have no authority to charge any levy whatsoever on alcohol, States continue to levy such duties.

Assocham call for ancillaries link-up

The Associated Chambers of Commerce and Industry (Assocham) has suggested the setting up of a central co-ordinating agency with the support of the department of small scale industry to promote the development of ancillaries in the country. An Assocham background paper on ancillarisation prepared for the workshop has also suggested activating the state level ancillary advisory committees which could advice the state governments to plan and provide infrastructure facilities and recommend measures to promote ancillarisation.

According to the background paper, the scope of ancillarisation is the highest in transportation and communication industries and quite significant in prime movers and power-based industries. Assochem is of the view that development agencies and industry associations should play a more active role in bringing about an understanding between the large and medium sector of the industry and the small scale ancillary units. While large and medium sectors have to plan their programme and identify specific areas for ancillarisation, the ancillary units should give greater attention to technical specifications, quality standards, delivery schedules and prices.

The paper also recommends that the nucleus plan scheme suggested in the industrial policy resolution of 1980 and being implemented in a few districts should be extensively adopted. Ancillary estates may also be planned to provide training facilities and also essential services like critical inputs such as power and raw materials. The chamber recommends growth by linkage, that is, the large scale sector should be linked to the small sector in a manner that growth in one does not preclude growth. According to the background paper, public sector undertakings purchased only 6.6 per cent of the production of the small scale sector in 1984-85, which was much less than many devel[...] countries. An Industrial Develop[...] Bank of India (IDBI) study shows [...] the private sector buys about 45 per [...] of small sector production.

INTERNATIONAL CONFERE[...] ON COAL AND SLURRY TECHNOLOGY

The Coal & Slurry Techno[...] Association has released the pro[...] for its 15th International Conferen[...] Coal & Slurry Technology. This a[...] industry event which is co-hosted b[...] Pittsburgh Energy Technology C[...] of the U.S. Department of Energ[...] be held from April 23-26, 1990, in [...] water, Florida. Approximately [...] hundred attendees are expected, in[...] ing coal and fuel producers, engi[...] academicians, researchers, and m[...] facturers of equipment and mat[...]

The U.S. Department of En[...] Assistant Secretary for Fossil Ene[...] scheduled to deliver the Ke[...] Address. Highlighting the conf[...] program this year are the three lu[...] speakers: Jack Siegal, Deputy As[...] Secretary for Coal Technolog[...] Lowell Miller, Associate D[...] Assistant Secretary for Clean [...] Technology; and a high ranking [...] try official from the Soviet Unio[...] rent technological developments [...] featured in the seventy-four te[...] papers covering Atomization & [...] bustion, Coal Liquefaction, Co[...] paration & Beneficiation, De[...] trations & Evaluations, Major P[...] Materials & Equipment, Pipeline [...] nology and Rheology, Character[...] and Formulation, Industry leade[...] 8 countries (Canada, England [...] gary, Italy, Japan, People's Rep[...] China, United States, and the U[...] will offer presentations on the s[...] the-art of coal and slurry techn[...] Additional details can be obtain[...] the Coal & Slurry Technology A[...] tion, 1156 Fifteenth Street, N.W[...] 525, Washington, D.C. [...] (202/296-1133).

Hurdle to Glaxo's expansion

Glaxo India proposes to more than double its betamethasone from 568 kgs. per annum to 1,800 kgs. capacity per annum at its existing factory at Thane. The only hitch Glaxo faces is the location policy guidelines of Maharashtra Govt. which does not permit either expansion or diversification at Thane.

The cost of the expansion is put at Rs. 650 lakhs with internal generation providing Rs. 162.50 lakhs, debentures not less than Rs. 243.75 lakhs and loans or acceptance from Financial Institutions not more than Rs. 243.75 lakhs. It is a greenfield site or in Glaxo's installations at Ankleshwar or Nasik, the cost could go up, while at Thane, the expansion should be more economical. The company has offered to shift some of its other facilities like fine chemicals to either Ankleshwar or Nasik to accommodate the betamethasone expansion. An important point being made by the company is that it may not be able to earn on betamethasone manufacture if it is located in any other place other than Thane. A Government pricing norm will only take into costs of current production. Perhaps, the location policy needs a relook though there is a precedent of Burroughs Wellcome being allowed to raise its capacity of dapsone at its existing facilities in Mulund under the existing location policy. With Government getting tough on pricing, Glaxo is keen on keeping costs low explaining its move. It has told the Government there will be no labour displacement.

Yet it is surprising that Glaxo, going in for expansion of betamethasone has been complaining or unremunerative prices. Last year prices were cut by Government and even now none is sure of the new price which Government may allow. There are reports circulating in the industry of the petrochemicals department working on a scheme to bring all bulk drug vitamins under Category 2 with 100 per cent mark-u Presently only Vitamins A and C, bu and formulations, are under Category If the Government implements the mo even before the working groups wo into details, it could send wrong signa especially for those units planning invest a total of around Rs. 300 cror in making Penicillin G. Except for o unit others have not been able to get t best of know-how as world leaders a apprehensive of the drug pricing polic

FIEO FOR FREE IMPORT OF TESTING EQUIPMENT

Mr. Ramu S. Deora, president, Fe eration of Indian Export Organisatio (FIEO), has urged the Union gove ment to make a provision in the n import-export policy for allowing i port of testing instruments for upgrad the quality of export products on a du free basis. Mr. Deora had pleaded this facility for exporters, because wi out computerised testing instruments would not be possible for them upgrade the quality of their export p ducts in conformity with internatio standards.

The cost of such instruments fr indigenous sources was prohibit because of the heavy incidence of in rect taxes on such instruments, such customs and excise duties. For reason, it was beyond the reach of exporting community, particularly sm units, to acquire such sophisticated advanced modern testing instrume indigenously, he pointed out.

CHIPLUN FINE TO MAKE IBUPROFEN

Ibuprofen a versatile fast-mov analgesic, will soon be produced at C plun in Konkan, a backward area Maharashtra. Promoted by Mr. A Sukhathankar and Dr. G.D. Ghod Chiplun Fine Chemicals Pvt. Ltd. designed to produce 90 tonnes of popular bulk drug per annum. M than half the output is meant for o seas markets.

Century bags rubber project

Century Textiles and Industries Ltd. of B.K. Birla has finally bagged the Rs. 450 crores synthetic rubber project in Maharashtra marking the end of years of musical chairs.

Bharat Petroleum Corporation Ltd. and Century Textiles were the main contenders for the project, for which Maharashtra Petrochemicals Ltd. a State Government undertaking, held letters of intent. MPCL, like most state industrial promotion bodies, was awaiting suitors with financial muscle after securing the letters of intent.

Bharat Petroleum was the first to bid for the project as some refinery products would provide the necessary feedstock for the project. However, the Maharashtra Government and its protege MPCL favoured the private sector co-promoter, Century Textiles. Century Textiles later offered to set up the project entirely through its own resources without any financial burden on MPCL. In other words, there would be no financial burden on the State exchequer. In view of this offer, MPCL offered to withdraw from the project altogether if Century managed to secure a letter of intent for setting up the same project in Maharashtra. Century concurred with the plan and efforts were on in this direction until a maverick intruded on the scene: Bennet Coleman & Company Ltd.

Bennet Coleman had sprung a surprise by bidding for mega projects to manufacture alpha olefins, polyethylene, styrene butadiene rubber and other chemicals at Raigad district in the State, at the same site where MPCL proposed to develop a petrochemical complex.

Once Bennet Coleman entered the fray, MPCL and the State Government began favouring the publishing house and cold-shouldering Century. The Jains roped in the Chief Minister Mr. Sharad Pawar who wrote to the t Union Industry Minister, Mr. Veng Rao last March asking him to grant to Bennet Coleman so that MPCL cc withdraw in its favour. Bennet Co man later abandoned all its petroch ical ambitions. The new project wil a major diversification for Cent whose interests now span paper, p shipping, textiles, rayon, tyrecord cement. The year ending Decembe has been a bumper year for the co pany. The company has done very w in all the activities during the year, g sing a turnover of Rs. 450 crores. project is to come up in Usar in Rai district. The two elastomers are sty butadiene rubber and polyisop rubber. Only the former is now mac the country, by Synthetics & Chem of Bareilly. India imports all types thetic elastomers including SBR.

The feedstock for Century's pro which the Government has how cle are to come from one of the two re eries in Bombay and from ONC facility in Uran. This is yet to be up. The company had entered in memorandum of understanding in 1 with Stearns Catalystic Division (S of United States who will be the eng ering contractors and project ordinators. The elastomer technolo to be tied up with one of the follov suppliers: Good Year, Goodrich Japan Synthetic.

INOX BAGS AWARD

Industrial Oxygen Co. Ltd. (Inox bagged the triennial award from th India Industrial Gasses Manufact Association for the third time in su sion for having achieved the best all growth amongst all industria manufacturers in India during 198 Inox is a 25-year-old company wi factories all over India. Under the ardship of Mr. P.K. Jain, Man Director, the company has emerg the second largest manufacturer of strial gases and air separation p — says a press release of the com

Biocon India launches new EOU

Biocon India Private Ltd., a pioneering bio-technology company located near Bangalore, has now launched a 100 per cent export-oriented unit (EOU) for the manufacture of industrial enzymes.

The new unit, Biochemizyme India Private Ltd., is in the joint sector with equity participation by Biocon India, Biocon Biochemicals Ltd., Ireland, which is owned by Unilever, and the Technology Development and Investment Centre of India (TDICI), the venture capital arm of the Industrial Credit and Investment Corporation of India (ICICI).

The new plant with an investment of Rs. 2 crores will be formally inaugurated by the Deputy Chairman of the Planning Commission, Mr. Ramakrishna Hegde, at Bangalore. The enzymes to be manufactured by the company are fungal enzymes that find wide application in the fruit juice, baking and other food industries in the industrialised countries as well as in the textile and paper industries abroad. According to Ms. Kiran Mazumdar, Director of Biocon India, the new plant is the result of indigenous R & D effort of Biocon India started six years ago.

The new company is expected to export enzymes worth Rs. 1 crore in the very first year and is likely to cross the Rs. 6 crores mark in four years, she said. The marketing of the enzymes would be taken care of by Biocon Biochemicals, Ireland, which has 25 subsidiaries worldwide, she added.

CHEMINOR DRUGS

Cheminor Drugs Ltd. part of Dr. Reddys group, which entered the capital market in November 1989, has declared an interim dividend of 25 per cent for 1989-90.

The company has developed te[...] logy for the manufacture of diltia[...] a widely used cardiovascular drug[...] diltiazem plant became operation[...] January and the products have been[...] received in the international as w[...] local market. In 1991, the com[...] expects to produce 25 tonnes of d[...] zem and its intermediate valued a[...] Rs. 15 crores.

The construction of the plant [...] Vizag for expansion of ibuprofen [...] city is expected to be completed b[...] end of the year. Negotiations are[...] at an advanced stage for the setti[...] of an overseas plant. In the first[...] months of the current year, the com[...] has earned over Rs. 13.40 c[...] through exports.

IRE MAY HAVE TO PAY R[...] LAKHS DEMURRAGE

The Indian Rare Earths (IRE)[...] a public sector unit under the A[...] Energy Commission, is under pr[...] to pay about Rs. 68 lakhs to[...] demurrage to NL Chemicals of C[...] for the sale of synthetic rutile, [...] duct of rare earth material from [...] sands complex near Berhampir.

Besides, it has claimed for the s[...] of 777 tonnes of synthetic rutile [...] was found short, according to an o[...] of the Orissa sands complex in Be[...] pir. The officer, who wanted an[...] ity said the IRE entered into a co[...] with NL Chemicals of Canada to [...] 5,300 tonnes of synthetic rutile at[...] of about $350 per tonne. An agre[...] was signed with Tanka Enter Isrs [...] it the sole contract of loading the [...] ial to the Shipm Tanaka Enter Is[...] engaged a local sub-contracto[...] rated the loading.

According to the said contra[...] mineral was to be loaded in the [...] loose condition, whereas the [...] contractor, in order to facilitate [...] loading, since the ship was in de[...] packed the mineral in gunny ba[...]

SPOTLIGHT ON

Biotechnology & Life Sciences (Part 2)

CATALYTIC ANTIBODIES (ABZYMES) — A NEW CHALLENGE IN BIOTECHNOLOGY

Catalytic antibodies made their debut as laboratory curiosities in 1986. Now these sophisticated entities are close to becoming true working tools for important chemical jobs like cutting through vital protein coats, deactivating toxic chemicals or making drugs with fewer side-effects. Researchers have already made antibodies that repair DNA damage caused by exposure to UV radiation, break the peptide bond between two specific amino acids, and transform one end of a linear molecule into a ring structure.

Though the catalytic rates of some antibodies have been raised considerably, the researchers agree that none are quite fast enough for practical applications. Since 1986, researchers have tailormade antibodies catalyse a dozen or so reactions. To do so, the scientists are combining techniques and principles of chemistry, molecular biology, immunology and genetic engineering to forge a new powerful chemical technology in future, theoretically capable of carrying out millions of reactions.

So far researchers have usually designed catalytic antibodies (also known as abzymes) by using the principle of transition state stabilisation, first formulated by Linus Pauling 40 years ago. Accordingly, enzymes speed up reaction by first binding reactant molecules into specific transitional structures (or geometries) that they rapidly rearrange into product molecules. Therefore, researchers reasoned, antibodies that can bind molecules in their transition state structures should be capable of speeding up any corresponding reactions these bound molecules might undergo.

Putting this principle to work takes diverse expertise. First a chemist makes a stable chemical analogue that 'looks like' the fleeting transition state of the reactant during the reaction the researchers wants to catalyse. An immunologist then injects a mouse with the long-lasting transition state analogue, which serves as an antigen. After immune system cells in the mouse's spleen start making antibodies chemically complementary to the analogue, the immunologist removes these cells and fuses some of them with modified tumour cells to make hybridomas or immortal lines of cells that continuously churn out monoclonal antibodies that bind to exactly the same chemical structure. Biochemists then test the monoclonal antibodies of each hybridoma to see which, if any, hasten the reaction.

Early in 1989, researchers Stephen Benkovic and Richard Lerner in USA have reported research work that may bring catalytic antibodies closer to the tool box of organic chemists. They have developed a pair of catalytic antibodies, each operating nearly exclusively on only one of two enantiomers of several ester-containing compounds. In practice, separating the otherwise identical enantiomers, which often form in equal amounts during chemical reactions, can be very difficult if not impossible: With such catalytic antibodies, however, chemists might be able to select one enantiomer of a pair. These catalytic antibodies might prove useful to the pharmaceutical industry where many drugs are produced as mixtures of enantiomers even though only one may be medically active and the other is responsible for deleterious side-effects.

In future, as researchers get better at developing catalytic antibodies that can rival enzymes in speed, a new era in laboratory science will emerge. Further, because antibodies can be made complementary to virtually any chemical structure, the application of a matured catalytic antibody technology should reach beyond the horizon of known possibilities. This new technology will put at our fingertips the means to create entirely new enzymes for use as research tools and also in medicine and industry.

The development of antibodies that catalyse any particular reaction takes a lot of time, money and technical expertise. Initially, these new chemical tools will find use in making specialty, high-value compounds. Hence, several biotech companies in advanced countries already have started up catalytic antibody (atzyme) projects. (*Chem. & Ind.*, 10/16/89, p.p. 664-65).

MAPPING AND SEQUENCING EVERY HUMAN GENE (HUMAN GENOME PROJECT)

The most exciting project in the history of biology, mapping and sequencing every human gene, could be completed within 15 years, according to Sir Walter Bodmer, director of the Imperial Cancer Research Fund (ICRF) in London.

The project involves isolating or mapping, the 10,000 human genes and analysing, or sequencing, the 3000 million base pairs that make up the genes. Prof. Charles Cantor, director of the Human Genome Centre at the Univ. of California, foresees the work progressing in three stages:

1. In the first five years, half of the genome will be mapped but only 1% will be sequenced.
2. In the next five years, all of the genome will be mapped with 10% sequenced.
3. In the third phase of five years, sequencing will be completed.

'It is very easy to start a map', Cantor reports 'but very hard to finish it. Ninety per cent of the effort is needed for the last 10% of the map'. The next step will be to determine a gene's fun ion from its structure, but Cantor admits that scientists are incompetent at this.

At the present, workers do not have the right computer software of hardware to take advantage of the data collected. According to Cantor, the computers needed to finish the project will have to be 10,000 times faster than those now available.

'The technology is changing so rapidly that plans are made and abandoned every few months', Cantor adds. 'Work stations and programmes become obsolete because the maps have changed.

The work is international, with the USA leading the way with government funds of $90 million for the human genome project next year and $150 million in 1991. European research is headed by a joint UK effort between the ICRF and the Medical Research Council, with the latter providing £2.5 million this year and £4 million each following year. The total cost of the project will be between £1,000 million and £2,000 million, Bodmer estimates.

International collaboration is essential, Bodmer believes, to prevent duplication and to keep the information freely available for the alleviation of human diseases and suffering. Collaboration will be overseen by the Humane Genome Organisation (HUGO), a group of 200 individuals, half from the USA and around 30 from Britain. (*Chem. & Ind.*, 10/16/89, p. 668).

BAYER PLANS FOR NEW BIOTECH DRUGS

Bayer, the leading German drug and chemical giant looks to biotechnology for providing new drugs in future, while at the same time placating environmental concerns about messing with genes.

The company recently announced a large increase in its research spending in the biotech area, to DM 1500 million/year within the next five years, from DM150 million/year last year. Bayer also reported it will be spending DM4 million on independent research into the risks connected with genetic engineering.

The capacity of Bayer's Research Centre at West Havan in Connecticut will be doubled by 1992 at a cost of DM100 million. This investment will make it one of the largest research centres in the world. Another research centre is planned in Japan.

Biotechnology sales for Bayer are expected to increase 5.7 per cent in 1989, from $1,300 million in 1988. The company has several biotech products under development at the moment, but it expects a long wait before its present investments pay off.

One of the most immediate prospects for marketing approval in USA and Japan is Factor VIII, a blood clotting agent for the treatment of haemophilia. The drug was developed by Genentech, however, Bayer is also working on an anti-diabetes drug and a drug for use in intensive care, which may be marketed within the next two years.

Longer term prospects include monoclonal antibodies (MABs) for the treatment of life-threatening shock and research into AIDS and Alzheimer's disease. Bayer's agriculture division is also looking at genetically engineered crops. (*Chem. & Ind.*, 10/16/89, p. 662).

CONTROLLING AFLATOXIN VIA SPECIAL BACTERIAL STRAIN OF B. SUBTILIS

Calgene Inc. (Davis, Calif.) and Gustafron Inc. of Dallas, Texas, have agreed to collaborate on a project to develop biological products to aid in the cont of plant diseases.

The above companies plan to u Calgen's patented 'GelCoat' technolo to encapsulate new strains of Bacill subtilis and Trichoderma as a means enhancing their biological activity. T initial project will be aimed at enha ing the efficacy of a proprietary str of Bacillus subtilis that has shown p mise for controlling aflatoxin.

A potent carcinogen that has recen received considerable attention in US aflatoxin has been the subject increased pressure from consu groups in the food industry. (*C* 10/30/89, p. 4).

GENETIC LINK FOR MANIC DEPRESSION STILL SOUGHT

The linkage between manic depr sive illness and a gene located near end of the chromosome 11 is no lon persuasive, say the researchers who f reported the connection two years a

The original claim that inheritanc this particular portion of a chromos predisposed people to develop m depressive illness was based on a year study of the occurrence of the ease within an extended family of Order Amist in Eastern Pennsylv led by Janice Egeland of the Univer of Miami. The researchers calcul the likelihood of the disease and the tion of chromosome occurring toge by chance in their study group t about one in 10,000.

Now Egeland and 11 co-aut report two additional members of family have developed the disease w out having the gene and that the s has been extended to 16 other fa members who, collectively do not f predicted pattern. The findings do mean that the disease does not genetic component, only that this s has not found it. (*C & EN*, 3/9/8 15). (*C & EN*, 11/20/89, p. 14).

PROTEIN DELIVERY BREAK-HROUGH PROMISES ADVANCE HERAPIES

Scientists at a UK research company ve developed a novel technique that uld abolish the need to inject protein erapies such as insulin. Cortecs, a ondon-based developer of sophisti-ted drug delivery systems, believes it s found a way of administering insu- orally.

Insulin is an essential hormone which ntrols blood sugar levels. This control lost in diabetics, which account for me 3% of the population, so, many ceive daily injections of insulin, as al form of the drug has proved elu-ve as proteins are degraded by gut zymes.

By wrapping the insulin molecule in envelope of fatty acid and fat mole-le, the protein is protected from the t enzyme attack. The envelope grades in the small intestine releasing ulin, where it absorbed intact into the oodstream.

Preliminary trials with 100 patients in rope and Asia show the technique es work, but a lot more work and dy are required. However, the com-ny is contacting major insulin produ-rs such as Novo Industry and Eli lly. This new protein delivery tech-que has potential for other therapeu-proteins, which at the moment must o be injected. Cortecs already has an & D arrangement with the US Phar-u eutical group Rorer to develop deli-y 'capsules' for calcitonin and AVP.

Calcitonin which has potential to treat teoporosis and Paget's disease is a rmone-like protein linked with the ntrol of bone calcium. DAVP is a lypeptide used to treat enuresis.

Although these are the only other rapeutic proteins being studied, the company's spokesman does not rule out the possibility of collaborations to develop delivery capsules for other potentially lucrative protein therapies. Drugs based on proteins with potentially massive markets include tpa, erythropoietin, the interleukins the interferons and blood factor. (*ECN*, 12/11/89, p. 25).

A LOW COST BIOTECH ROUTE FOR COMMERCIAL PRODUCTION OF L-ALANINE UNVEILED

Mitsubishi Petrochemical has recently unveiled a low cost route for commercial production of L-alanine amino acid from fumaric acid using fungi. The company plans to commercialise production in Japan in 1990 for use as a food additive. Costs could be as low as one-third of conventional enzymatic processes. Central to the new process are two fungi, Brevibacterium flavum and Pseudomonas dacunhae, which contain high concentrations of the enzymes aspartase and aspartate-B decarboxylase, respectively.

The fumaric acid is first reacted with L-aspartic acid in the presence of the aspartase and the product is then converted into L-alanine by means of the aspartate B-decarboxylase. The reaction is reported to occur at temperatures of around 45°C.

L-alanine is involved in the body's metabolism as a nitrogen carrier. High process costs around ¥3000-5000 ($21-35/kg) in Japan, have restricted its use to intravenous solutions. Mitsubishi is now optimistic its new biotech route will cut the price to as little as ¥1000/kg, opening up opportunities for use as a food additive. (*ECN*, 12/11/89, p. 24).

NERVE PROTEIN'S FIRST EVER CLONING

Scientists at US-based biotech company Syn laim to have purified and clo ew protein, ciliary neurotrophic factor (CNTF) that may be useful in treating serious diseases of the nervous system.

CNTF is produced in neural tissues and is released in response to injury. The protein sustains cells in the nervous system that convey sensation and control the function of both muscles and organs.

Synergen's neuroscience research group, led by Frank Collins, reports that it has expressed biologically active recombinant CNTF by using rabbit sciatic nerve complementary DNA. It is the fourth neurotrophic protein to be identified with neurotrophic activities distinct from nerve growth factor.

Researchers believe CNTF may be an effective treatment to prevent damage to nerve cells resulting from diabetes and kidney dysfunction. It may also be useful in overcoming the toxic effects of chemotherapy used in cancer and AIDS treatment. Nerve damage caused by these conditions is currently untreatable. (*ECN*, 12/11/89, p. 24).

FOOD WASTES — A NEW SOURCE OF BIODEGRADABLE PLASTICS

Long term ambitious plans are under study in USA for converting food wastes to biodegradable plastics and other useful products. Researchers at Argonne National Laboratory, Illinois, have developed technology to convert high carbohydrate food wastes, such as potato peel and cheese whey permeate, into polymer grade lactic acid. Lactic acid polymers are being designed that are stronger and exhibit enhanced bio- and photodegradability over other degradable plastics.

First target for the polymers is the agricultural market, where low molecular weight polylactates are seen to hold promise as sustained release systems for fertilisers and pesticides.

In the new process, more than 90% of the starch in potato wastes is enzymatically hydrolysed to glucose, the glucose continuously fermented to lactic acid and the lactic acid recovered, concentrated and purified. Bioconversion of potato starch to glucose, takes place in as little as 10 hours, one-tenth that of conventional technology. Lactic acid is produced in 95% yield in under 48 hours. Work is continuing to improve the economics and versatility of the lactic acid polymerisation.

Further, Argonne is collaborating with the US National Fertilizer Development Centre in Tennessee to test the use of polylactates for the sustained release of urea-based fertilisers. Field tests are set to begin soon. Further industrial support or participation is sought to help scale-up lactic acid production and to test and market the biodegradable polylactates.

In the USA around 10 million pounds/year (14.53 million ton/year) of potato wastes is discarded or sold as cattle feed for as little as $3 per ton. A process for bioconverting high carbohydrate food waste to lactic acid will not only help solve a waste problem of the food industry but should stimulate the development of lactic acid as a commodity compound for use in degradable plastics.

The market for degradable plastics is projected to grow at 75% per year from 1987 to 1992. For degradable films the projected growth rate is 146% per annum in USA. (*ECN*, 11/20/89, p. 26).

A NEW MOBILE SYSTEM TO DECONTAMINATE PESTICIDE WASTE WATER UNDER DEVELOPMENT

A new technique to decontaminate pesticide waste water produced in agricultural communities is being developed by the US Department of Agriculture and Ciba Geigy Corp. The aim is to develop a portable method of destroying pesticides in water such as those used in spraying equipment.

The treatment employs a combination of chemical and biological attack. The wastewater is first oxidised in a tank by the introduction of ozone, followed by percolating through a soil bed innoculated with Pseudomonas A.

The bacteria, which is naturally occurring was discovered and patented by Ciba-Geigy and breaks the o wise resilient ring structures four most pesticides. The byproducts o process are ammonia and urea, w if discharged, are converted by soil teria into nitrogenous compo (*ECN*, 11/20/89, p. 26).

MICROBIAL DETOXIFICATI OF PULP MILL EFFLUENT

Lund University (Sweden) rese ers have recently detailed a novel robic method of detoxifying pulp effluent. In this process pulp mill e ent is pretreated by addition of a nu of proprietary undisclosed micro nisms and aluminium ions, and transferred into an anaerobic re where lack of oxygen results in th mation of methane.

Tests have shown the anae treatment primarily reduces ac methanol and carbohydrates, wood extracts can be removed aerobic post treatment. The bypr methane can be used as fuel fo plant. The method has been on tri two years, treating some 2,800 toxic effluents per day at a pulp m Timia (north Sweden). (*ECN*, 12/ p. 24).

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Public Liability Insurance

V.K. AGARWAL
Insurance Officer, Indian Dyestuff Industries Ltd.

Introduction

This insurance is mainly to get rid of potential liabilities, monetary burden and the worries due to negligence.

Public Liability Insurance did not develop until towards the end of the nineteenth century, and the main reason for this delay was the belief that such insurance was contrary to Public Policy. There was a change in attitude towards liability insurance generally with the passing of the Employer's Liability Act, 1880 in England. Immediately after which General Public Liability Policies were issued. This Act increased the liabilities of certain employers, and it began to be realised that an accident might cause injuries to members of the public as well as to employees. Neither the term Third Party nor Public Liability Insurance was in use in those days and the business was described as "Outside Risk Insurance". Policies were confined mainly to builders and building contractors who realised that the omission to insure against the consequences of negligence, on the part of their employees, might be such as to deprive them of the profit to be expected from their contacts or even to render them insolvent if serious claims were brought against them on account of injury to, or damage to the property of third parties.

Need for Public Liability Insurance in the 20th Century

The need has arisen for Public Liability Insurance due to

a) development of residential complexes around the industrial belts (which at one time were considered to be away and at a distance) and thus increased risks of accidents.

b) Awareness and consciousness: There is an increasing awareness in the general public of their legal rights. Under the "Tort" and "Common Law" people have rights for compensation against any damages caused to their life and property due to the negligent act on the part of other people.

c) Publicity: Newspapers, periodicals, journals and magazines often contain articles of legal nature. Important trials, particularly involving big industrial houses and multinational companies are front page news and civil action where heavy damages are awarded, usually receive great publicity. The Bhopal incidence of 1984 followed by the oleum gas leakage in 1985 gave considerable publicity regarding exposure to Public Liability and Environmental Pollution arising out of use of toxic and hazardous chemicals/substances.

d) Legal verdicts: The Supreme Court in the case of the oleum gas leakage of Shriram Food and Fertilisers gave a landmark judgement enunciating the principles of "Strict Liability" and payment of compensation according to the paying capacity of the "Enterprise".

Standard Public Liability Insurance Policy

In India till 1987 no Standard Policy was used by insurers. Most policies had much similarity in wordings. The General Insurance Company (GIC) introduced Public Liability and Product Liability Tariff, which is known as "Market Agreement" and has come into force w.e.f. 1st January, 1988.

1. Under Standard Public Liability Insurance Policy, the Insurance Company undertakes to indemnify the insured in respect of accidents happening in India and in connection with the insured's business against Legal Liability in respect of:
1. Death or bodily injury, illness or disease of or to any person,
2. Loss or damage to property,
3. Defence cost of incurred with the consent of the insurer.
4. Pollution-Public Liability Insurance world over excludes the risk of gradual pollution, but Accidental Pollution may be extended to be covered at an additional premium.
5. Transportation - Legal Liability arising out of transportation of material and/or hazardous/dangerous substances outside the Insured's premises can be covered if specifically requested and extra premium is paid.

2. Maximum amount to be insured: The agreement (Public Liability Tariff) applies to industrial and storage risks with maximum limit of Rs. 3.25 crores for any one accident and aggregate limits of indemnity for any one year during the policy period upto Rs. 13 crores within the geographical limits of India.

Proposals in excess of the above limits as also in respect of risks out of India shall be referred to the "Market Agreement Committee" for rates, terms and conditions. Maximum ratio of limits of indemnity for any one accident to any one year is limited to 1:4 (i.e. any one accident: four times more for any one year).

3. Multiple units: More than one manufacturing unit located at different sites under single limits of indemnity per any one accident/any one policy period be covered.

4. Other locations to be covered: Besides manufacturing units, non-manufacturing locations, like head office, branches, warehouses, tank farms, etc. are also covered without extra premium.

5. Personnel to be covered: Officials, directors, employees, etc. are also covered even in their individual capacities without any extra premium.

6. Legal Expenses: Limits of indemnity includes legal costs and expenses incurred with prior consent of insurer.

7. Revision in sum insured: No provisions for increase/decrease are allowed in the limits of indemnity during the currency of the policy. However, within the same indemnity limits, additional limits may be included with retrospective date at inception of such inclusion in the policy.

8. Exclusion of risks: Liability arising out of natural calamity — act of God, viz. earthquake, storm, floods, etc. is excluded under the policy. However, it can be covered by payment of extra premium.

9. Jurisdiction: Jurisdiction of the policy is confined to India in respect of Public Liability Insurance.

10. Excess clause: There is a compulsory excess of 1/4 per cent with maximum of Rs. 1,00,000 for every claim. Further, provision is also made for voluntary excess with appropriate discounts in the premium with 15 per cent maximum on 10 per cent of voluntary excess.

11. Discount in premium: Provision is also made to give maximum of 25% discount subject to various favourable features, where the total premium under one policy exceeds Rs. 2 lakhs.

12. Claims: The policy is on "Claims Made" basis with usual retrospective date being the date of inception of the policy for the first time and continued to be renewed thereafter without break. As soon as any claim is paid, the aggregate limits of indemnity stand reduced correspondingly, reinstatement of aggregate limit is totally prohibited.

13. Classification of risks: The most hazardous industries have been grouped in Category IV and the least hazardous industries have been categorised under Category I.

14. Other features: a) Public Liability Policy cannot be issued for unlimited liability. b) Liabilities arising out and incidental to transportation of materials including hazardous/-dangerous substances can also be covered by paying additional premium. c) Standard Public Liability Policy can have a number of extensions such as liability for accidents arising out of fire and explosions, claims on account of defective sanitation, claims in respect of effluent risk and risk arising out of defective products. d) The rates of premium under this agreement are annual rates based on the limits of liabilities as well as the annual turnover.

15. Important points to note: 1. Risk group. 2. The selection of limit of indemnity is most important as the premium for Rs. 1 lakh indemnity and for Rs. 10 lakhs would be the same. Likewise, Rs. 25 lakhs and Rs. 50 lakhs would be the same. 3. To cover multi-units under single limit of indemnity instead of having different policies for different units. 4. More than one manufacturing unit located at different sites under single limits of indemnity per any one accident/a one policy period can be covered. 5. Premium for risk gr '1' is substantially less than risk group 2, 3 and 4. 6. Pul Liability risks are usually of low frequency but high se ity. 7. Additional premium for pollution cover varies fr 10% to 50%.

Risk group	Loading
1.	10% of the total premium
2.	15% of the total premium
3.	30% of the total premium
4.	50% of the total premium

8. The claim under this policy will be admitted within days from the date of expiry or cancellation of the policy notification of claims for accidents.

16. Risk assessment: For assessing the risks, Insura companies depute their engineers who carry out deta inspection and highlight the risk factors and the safety m sures adopted by the insured. The main points incorpor in the report are as under:

1. Nature of the manufacturing activity, location of risk particulars of surrounding property.
2. Type of products manufactured.
3. Surrounding population in the radius of 5 kms.
4. If any river/sea is situated nearby and whether the w is being used for drinking/fishing purposes.
5. General description and age of the building, plant machinery.
6. Particulars of storage tanks; such as, thickness, freque of inspection, material with which made of and qua stored, etc.
7. Details of raw materials/finished products and sto thereof; details of manufacturing process of plants in ing the method of affluent discharge and chemical t ment prior to discharge, back up system for main and machinery, details of hazardous and risks pr involved, details of transport system including loa unloading operations, transfer from tank to tank, ta tanker, incoming raw materials, out-going finished ducts, etc.
8. Details of lifts, elevators, cranes and movable mach within business premises.
9. House-keeping.
10. Safety policy of the company — whether any man booklet prescribed or not and how safety is enfo
11. Medical facilities, general safety and other protec
12. On site/off site evacuation and emergency plans (di planning).
13. Fire fighting equipment and how often fire drills, et carried out.
14. Chances of pollution and the safety measures ad Whether the plant is subject to regular inspection by ernment authorities as per the existing Pollution L the State or not.

MATERIALS MANAGEMENT

Part XII - Materials Handling (Contd.)

N.R. PAI

actors influencing material flow (Contd.)

. Travel distance

When material is moved between two successive points f use it covers some distance geographically. More the distance, more is the dependence on handling procedures. Again ith the increase in the distance between use points following factors come into play:

. Expenditure shoots up.
. There is a lowering of transfer efficiency.
. Possibility of goods transfer in good condition comes down.
. Time of transfer generally steps up. However this factor also depends upon the speed with which the transfer is effected.
. In-process material and hence goods in process step up.

Expenditure shooting up

Expenditure due to materials handling depends upon:
Equipment cost.
Labour expenses.
Operational cost of services employed e.g. usage of electricity or that of compressed air etc. needed to run these equipments.

Now, as the distance steps up, cost increases basically ecause of three factors:

Stronger and more powerful equipment is needed to effect the transfer. It costs more, affecting capital expenditure.
Labour has to be moved over greater distance which means more man hours spent per unit of work done resulting in expenditure rise.
Services like electricity required to operate. Stronger i.e. higher h.p. (horse power) equipments is more. It enhances working cost or operational expenses.

Lowering of transfer efficiency

As the distance between two operational points increases e material has to be moved for a longer time without being ocessed thereby bringing down transfer efficiency. Again re the travel distance greater are the chances of moved terial getting subjected to vibrational influences.

Possibility of goods getting damaged increases with stance

This stands as a corollary to point 2 above. More the disce more are the chances of goods getting influenced by rces of vibrations, stresses and strains which in turn enhan- s the chances of their getting damaged during transfer.

4. Time factor increases with distance

As the time factor increases, the material is not available for next operational purpose for a longer time, thereby bringing down handling efficiency, because the purpose of material transfer is to render it available for the next processing operation. However this factor depends upon rate of transfer also. By using stronger and more efficient machines transfer speed can be enhanced to compensate for the travel distance. But then there is a limit to this speed of transfer and higher the speed greater are the chances of material damage during transit, as influences of vibration, stresses and strains on it are likely to step up. More powerful machines also raise the cost of buying and of operating them.

4. Movement direction

There are three directions in which materials can be moved. These are i) downwards ii) upwards and iii) horizontal.

Direction of movement plays an important role in deciding transfer efficiency and transfer cost. Again movement direction depends upon operation requirements and available facilities also. In moving material downwards, advantage of gravity is taken and gravity is a force available to any one at any time. It is free of charge and does not require any powered aid. Its only defect is it is unidirectional. In industry use of gravity is made with great advantage in gravity fed bins, certain conveyors and chutes.

The next preferred flow direction is horizontal movement. It requires muscle power or machine power for its operation and involves "push" or "pull". Use of wheels and rollers make this movement more efficient. Examples of equipment used are : carts, trucks, dollies etc.

The upward movement requires application of maximum force since this movement is against gravity. Much energy is required to overcome gravitational force. It has therefore low efficiency and high cost. It is least preferred and is resorted to as a last major or final alternative open to the materials man.

5. Flow magnitude

Amount of material handled per unit of time determines intensity of material movement. It is often described in terms of "flow loading" and is considered in terms of volume of material handled and frequency of this handling. Frequency determines "how often certain definite volume of material is transferred in a given period of time". In this respect the

main flow of materials handling function is to avoid bottlenecks (in production operations for example) by balancing the flow of material between two successive points of operation.

6. Allotted space

Plant layout borderlines the area within the framework of which the material movements can take place in a manufacturing plant. It is within this restricted area that material handling equipments and their functions must try to furnish material flow of the required intensity so that production runs smoothly, unhindered and again its preplanned speed is maintained, thereby keeping up the planned production schedule. The space ear-marked by plant layout then becomes the available space in a manufacturing facility which can be allocated to different manufacturing activities according to the priority of needs. It thus becomes clear that these different organisational functions compete with one another for space. Space, today is a very costly resource and has to be efficiently distributed amongst different equipments and functions. The materials handling function competes for space, firstly for its own requirements and secondly for carrying out the functions it supports.

Space is thus required as floor space for fixed or for equipments mounted on foundations, as an operating area like terminal turning space and lastly as an aisle room for mobile machines. It is also needed as overhead space for overhead operated equipments and machines. Aisle width should be broad enough to allow free flow of materials and easy movement of men. These movements should be with ease, with agility and without giving any chance of the accident because of enhanced proximity of men and materials to the machines fixed on foundations.

Today, space planning is a specialised job. Space is planned for shop floor with respect to manufacturing activity. Space planning is also needed to carryout physical supply efficiently and to effectively control movement planning for distribution.

With the rise in prices of land, utilisation of vertical space is today sought after by raising multistoried structures. They are constructions of choice as compared to sprawling single storey structures, since vertical space is made available thereby. However, with the multilevel facilities comes the use of powerful machines to lift materials at required heights. Such machines and equipments then become a "must". It then involves substantial expenditure by way of purchasing (the machines) expenses as well as by way of their operating costs.

7. Expenditure incurred

Materials handling cost is often shown as an indirect accounting expenditure in operations, in manufacturing, in distribution function or in physical supply activity. At tim it is absorbed as the organisations general overhead charge Often this cost forms significant portion of total productio cost. It can even reach upto 50 per cent of total productio cost.

Systems employed in materials handling function

There are three systems commonly employed in mater handling function. These are: manual handling systen machine handled systems and the latest computerised au mated systems. In manual handling systems lot of empha is put on manual labour with little or practically no depe dence on machines. In mechanised systems we get a co bination of machine and manual handling. It is less lab intensive than the first one. In automated computerised s tems, least labour force is required and the system is hig machine intensive. Such systems are generally "tailor-mad They are made to suit the particular required set of operatio

Selection of handling system

Selection of handling system is generally based on co benefit analysis. Generally automation is preferred wh materials can be repeatedly moved in high volumes in a fi flow path. This system eliminates manual supervisio handling function. However the cost of materials hand forms a substantial portion of total product cost in this syst

Cost analysis

When analysed, materials handling costs come under lowing heads: Purchasing cost of machines and equipm as also their operating costs. Expenditure incurred on la and equipment maintenance. Today it is also a practic include under materials handling cost, loss incurred du machine downtime and due to wastage of man-hours.

Equipments available for materials handling

There are innumerable varieties of equipments avai to a materials manager and their selection has to be m carefully, looking to the amount of labour that can be s cost of purchasing and of operating these equipments. A it should be seen whether they can fit in, in the space a able and whether there is any special purpose to which an equipment can be put to use. The best way of stu them is to classify all the available equipments into categories. We thus have the following categories:

1. Elevators and lifts
2. Tractors
3. Trucks
4. Conveyors
   and
5. Monorails and undertows

1. Elevators and lifts

These are specifically designed to carry out v

wards and downward) movements. In this class we include sts, cranes and derricks also. Cranes and derricks are genlly provided with chains and cables to facilitate lifting. anes are generally movable from place to place while derks as a class are usually fixed in one place. We often find se in use in docks and shipyards. Pneumatic pumps are en used as lifting aids. Lifts and hoists can operate on elecity or on hydraulic system by making use of Pascals law hydrostatic paradox. This is a cheap method and elimies use of power.

Tractors

These are wheeled vehicles and are often employed for ving goods on a variable path. They have the ability to h and pull. Generally they are powered vehicles.

Trucks

These are wheeled too, but they possess the ability to lift carry the goods. Fork lift truck is the variety often met h. It also comes in a number of sizes and designs. Trucks y be powered or may be operable manually.

Conveyors

They are generally used when materials have to be moved ng fixed or sometimes along semifixed path. There are main varieties. The fixed or stationary surface conveywhich work on the use of roller coasters etc. over which material is moved and secondly conveyors with moving face. They work on belts, buckets, slots or chains. Here material moves along with the moving surface on which s placed for the purpose of transfer.

Monorails and underfloor tows

These are useful in fixed path system. In monorails the erial is moved in a suspended position above the ground the predetermined path. Underfloor tows are usually chanically powered devices meant to push or pull wheeled icles.

Over and above these usual category of devices we also e special systems to handle materials. This becomes a essity when material handling assumes the integral part unction it serves e.g. in automatic production systems.

ection of handling equipment

is based on the following factors:

Expenditure in purchasing them.
Whether it can serve to the exact needs of the buyer.
Ease of operating it.
Spare parts availability.
Period over which it will be useful to the purchaser.
Any special purpose it can serve.
Minimum operating cost.

8. Risk of accident if any, involved in its use. i.e. safety outlook.
9. Ease of training operators.
10. Its maintenance expenses.
11. Whether it can be repaired indigenously.
12. Can it serve any special purpose or serve purposes other than the one for which it is purchased.

In general for continuous production systems fixed path for material flow is employed. This choice brings in the use of conveyors, pipes, monorails, underflow tows, chutes, lifts etc. It is worth noting that continuous material flow is needed in automatic computerised systems of manufacture. Such equipments are costly and their purchase and use is justified only in case of mass production, where equipment use is maximum.

However, in our country we still have intermittant production systems, at several places. We have lot of untapped manpower. Variable-path equipment is recommended in such cases. Dollies, tractors, trucks, forklifts are the equipments of choice here. These equipments are manually operated and need additional man power.

Here, it is worth noting that more the reliance on machine less are the mistakes and faults committed. Machines work faithfully. Human element is usually likely to cover up its mistakes quietly which is not the case with machines. Hence, there is lately a tendency to go in for equipment intensive materials handling.

While deciding on the equipment to be used for materials handling, the materials manager has to take into consideration, quantity of material to be handled at a time and also type of material that is being handled, whether it is corrosive, poisonous, hazardous (as some chemicals are), or fragile, shock-sensitive (e.g glass, electronic equipments etc.). Again he has to think about the path between two points within which the material has to be moved, as also the geographical distance between them.

Equipment availability

There are three ways of making available the required handling equipment. Materials manager can go in for outright purchase. However, purchase involves substantial funds and is justified only in those cases where the equipment bought is used for a sufficient length of time and during this time its full capacity is utilised.

The second alternative is to get the equipment on rental basis. This is preferred when forthcoming handling necessities are not certain, or enough funds are not immediately available, or lot of operational changes are anticipated in the near future.

The third alternative is to go in for lease. Generally with lease, contract vendor bears the responsibility of equipment upkeep as also of its maintenance. However, the user has to strictly follow the contractual terms of its use. Risk to the user is therefore minimum in this alternative.

Augmenting handling efficiencies

Apart from the use of the right equipment for materials handling it is important that handling efficiencies are maximised by the user. This is done by implementing the following points:

Maximised load that is carried every time by the equipment so that full use of its capacity is made. Minimise idle time of handling equipment. As far as possible, use of str paths and avoid moving in reverse directions. Aisle are should be optimised. Gravity should be used with adva wherever possible. It has been observed that product l enhances material handling efficiency.

Always one has to be on a look out for combinin two successive operations so that handling between th automatically eliminated. Wherever possible integrate ling operation with manufacturing activity or with ph supply and or with distribution functions. In the first for example material gets processed as it is handled. also been found more advantageous to move material in of men wherever possible.

IR in national development

\ profile of CSIR today is:

Laboratories	41
Scientific staff	6,500
Total staff	26,000
Annual expenditure (Rs. Cr.)	250
External cash inflow (Rs. Cr.)	55
Industrial production (Rs. Cr.)	1,000
Savings accruing (Rs. Cr.)	100
Scientific papers/year	2,000
Patents filed/year	100
Extramural research schemes	900
Research fellows/associates supported	3,300
Pool officers in place	650

The external cash flow, coming from Government Agen-s (increasingly for specific goal-oriented activities) and m industries, is a measure of its credibility. This has been reasing rapidly in the last few years (Fig. 5) and is cur-tly around Rs. 55 crore — 26% of its budget.

he cumulative industrial production based on CSIR whow has increased from a very low value of Rs. 0.3 re in 1960 to Rs. 7,500 crores in 1989 in a matter of three ades (Fig. 6). Annual industrial production from processes ctly licensed by CSIR is now around Rs. 1,000 crores. e attribute half of Government investment to the tech-ogical efforts then the ratio of production to investment 0:1 — quite an acceptable figure (Fig. 7).

the last few years there have been several major tech-gical achievements with major marketing potential within a and abroad. These include: Novel catalyst and process conversion of ethanol and benzene to ethyl benzene; tchroman: A novel, once-a-week, non-steroidal post-coital ale contraceptive; Flosolver: Parallel processing comput-system; and Microprocessor based system for sugar and d industries.

uch of the researches (30-40%) are now earmarked for ion mode operations. Four specific types of missions have undertaken. These are given below (along with a few ic activities as examples):

ocietal/Poverty alleviation programmes.

r targeting, desalination of water and water harvesting rage.
cost building materials
processing and agroprocessing
icinal and aromatic plants

ational S & T programmes

aronomy satellite
rconductivity
Global change
Polymetallic nodules
Antarctica programme
Parallel processing
Resources and parameter mapping of EEZ of India
Standardisation, meteorology and quality system

C. CSIR mission programmes

New materials
Micro-electronics
Agrochemicals
Catalyst science and engineering
Industrial toxicology
Drugs, diagnostics and reagents
Risk and hazard analysis
Road transportation

D. New major facilities

VLBI
C-MMACS (All-CSIR Centre)
Component integrity evaluation centre
National instrumentation facility for biology

For material development a very critical role is played by standardisation, meteorology and quality systems. In this the nodal role is that of NPL and there is involvement of a number of other CSIR laboratories (such as CSIO, CEERI, CMERI, NAL, NEERI and ITRC).

The calibration service activities in CSIR under the national programme NCTCF (National Coordination of Testing and Calibration Facilities) is as follows:

Assessment and accredition of calibration labs in a three echelon systems
NPL: Echelon I (Except for ionising radiation)
CEERI, CSIO: Echelon II (Specific parameters) NML, NAL

I will end with a short description of two areas where impact has been pronounced. These are: 1. agrochemicals and 2. drugs. In the case of agrochemicals, the objectives have been: Development of safe and economical process for known pesticides and plant growth promoters. Synthesis of organic compounds and isolation of natural plant compounds with potential pesticidal activity. Development of novel safe and effective pesticide formulations. Development of environmentally safe methods for pest management. Toxicity evaluation.

Achievements in the area are substantial. Technologies have been developed for 20 agrochemicals out of which 15 are in production. The annual turnover is Rs. 100 crores and we expect an additional turnover of Rs. 150 crores in the next five years.

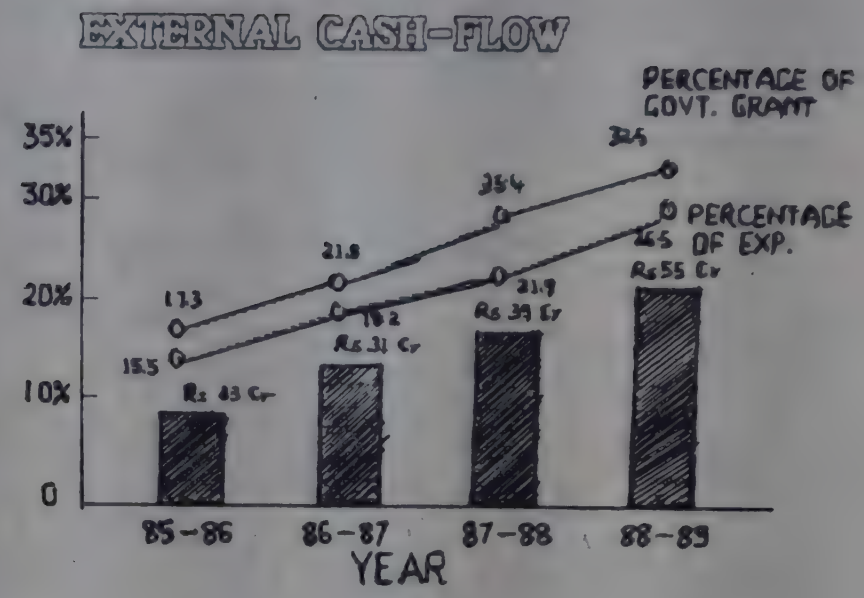

FIG.5

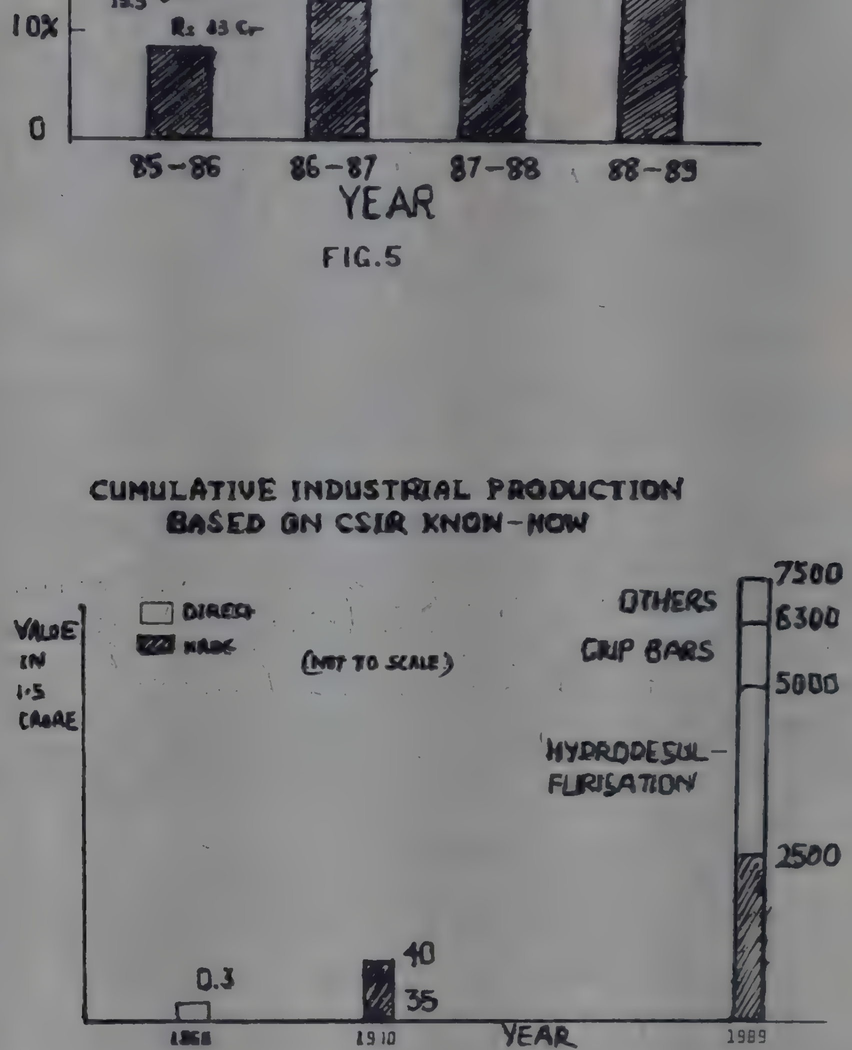

FIG.6

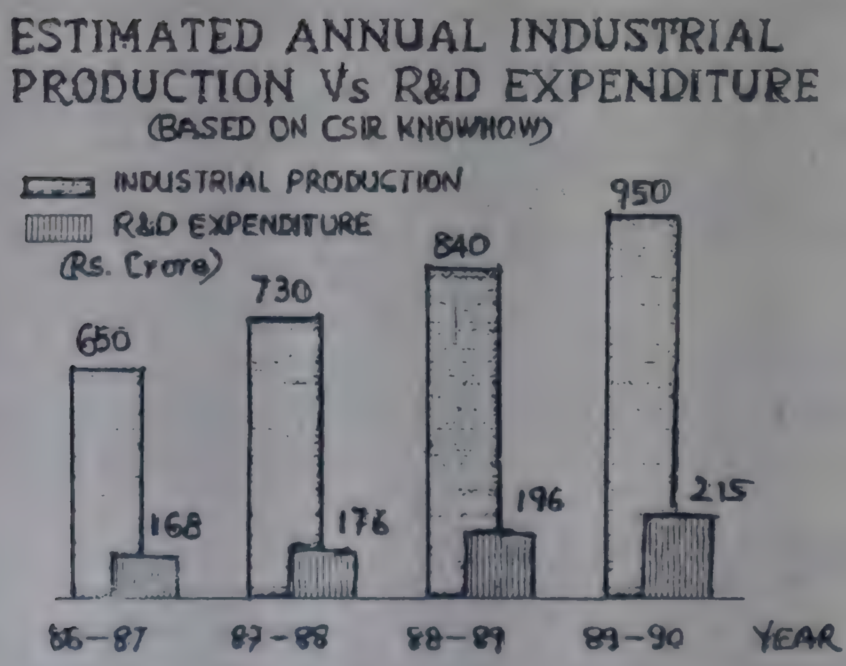

FIG.7

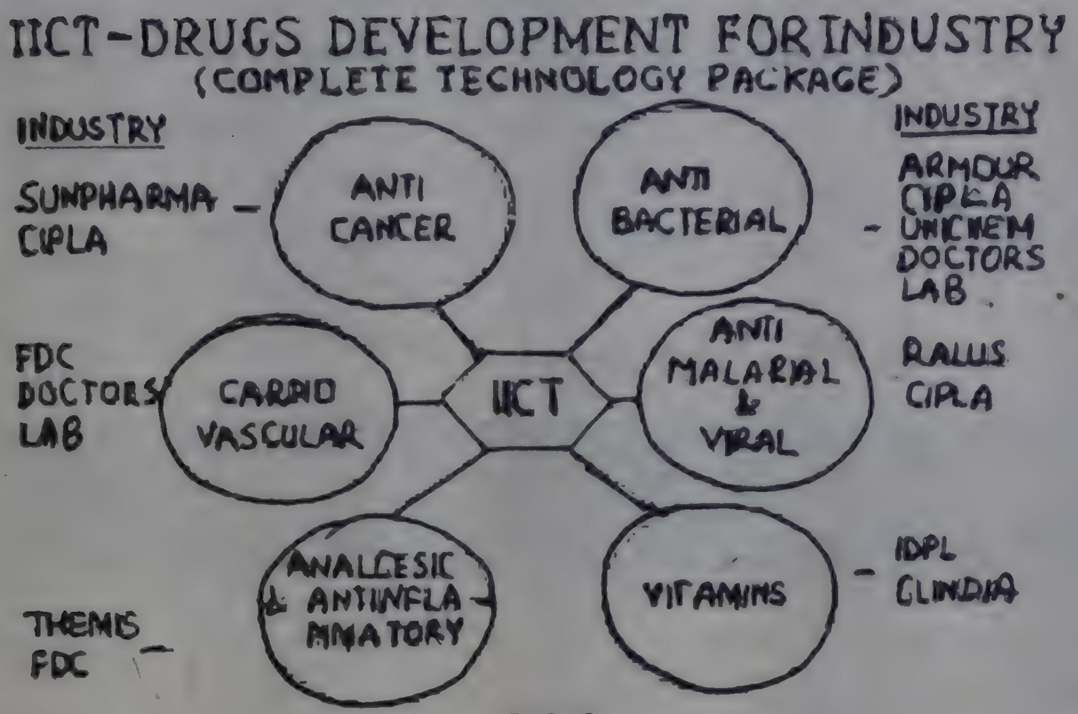

FIG.8

In the area of drugs a rapid growth and technological ackup are emerging from laboratories like IICT, NCL, DRI, IICB, IMT, RRL-Jorhat. The objectives are:
ew drugs,
rocess development of known drugs,
ew vaccines,
mmunodiagnostics and reagents,
rug delivery systems,
oxicity and efficacy evaluation.

New drugs that are either in the market or will be there oon include:
ugulipid (hypolipidaemic)
entchroman (contraceptive, anticancer)
entpropazine (anti depressant)
Chandonium iodide (neuromuscular blocker)
Consap cream (spermicidal)
80/574 (hypolipidaemic)
Coleonol (hypotensive)
M-Habana (antileprosy)
Malaria vaccine

A major success story relates to the efforts of IICT in developing complete technology packages for the drug industry. This is shown in Fig. 8.

Concluding remarks

The climate is right: both scientific and industrial. Human resources at advanced level is the major problem. This is a responsibility of senior scientists.

Public Liability Insurance

V.K. AGARWAL
Insurance Officer, Indian Dyestuff Industries Ltd.

ntroduction

This insurance is mainly to get rid of potential liabilities, ionetary burden and the worries due to negligence.

Public Liability Insurance did not develop until towards he end of the nineteenth century, and the main reason for his delay was the belief that such insurance was contrary Public Policy. There was a change in attitude towards liabity insurance generally with the passing of the Employer's iability Act, 1880 in England. Immediately after which Genral Public Liability Policies were issued. This Act increased e liabilities of certain employers, and it began to be realed that an accident might cause injuries to members of the ublic as well as to employees. Neither the term Third Party or Public Liability Insurance was in use in those days and e business was described as "Outside Risk Insurance". Pocies were confined mainly to builders and building contracrs who realised that the omission to insure against the conquences of negligence, on the part of their employees, might e such as to deprive them of the profit to be expected from eir contacts or even to render them insolvent if serious aims were brought against them on account of injury to, damage to the property of third parties.

eed for Public Liability Insurance in the 20th Century

The need has arisen for Public Liability Insurance due to

a) development of residential complexes around the indurial belts (which at one time were considered to be away d at a distance) and thus increased risks of accidents.

b) Awareness and consciousness: There is an increasing vareness in the general public of their legal rights. Under e "Tort" and "Common Law" people have rights for mpensation against any damages caused to their life and operty due to the negligent act on the part of other people.

c) Publicity: Newspapers, periodicals, journals and magines often contain articles of legal nature. Important trials, rticularly involving big industrial houses and multinational mpanies are front page news and civil action where heavy mages are awarded, usually receive great publicity. The hopal incidence of 1984 followed by the oleum gas leake in 1985 gave considerable publicity regarding exposure Public Liability and Environmental Pollution arising out use of toxic and hazardous chemicals/substances.

d) Legal verdicts: The Supreme Court in the case of the eum gas leakage of Shriram Food and Fertilisers gave a ndmark judgement enunciating the principles of "Strict Liability" and payment of compensation according to the paying capacity of the "Enterprise".

Standard Public Liability Insurance Policy

In India till 1987 no Standard Policy was used by insurers. Most policies had much similarity in wordings. The General Insurance Company (GIC) introduced Public Liability and Product Liability Tariff, which is known as "Market Agreement" and has come into force w.e.f. 1st January, 1988.

1. Under Standard Public Liability Insurance Policy, the Insurance Company undertakes to indemnify the insured in respect of accidents happening in India and in connection with the insured's business against Legal Liability in respect of:

1. Death or bodily injury, illness or disease of or to any person,
2. Loss or damage to property,
3. Defence cost of incurred with the consent of the insurer.
4. Pollution-Public Liability Insurance world over excludes the risk of gradual pollution, but Accidental Pollution may be extended to be covered at an additional premium.
5. Transportation - Legal Liability arising out of transportation of material and/or hazardous/dangerous substances outside the Insured's premises can be covered if specifically requested and extra premium is paid.

2. Maximum amount to be insured: The agreement (Public Liability Tariff) applies to industrial and storage risks with maximum limit of Rs. 3.25 crores for any one accident and aggregate limits of indemnity for any one year during the policy period upto Rs. 13 crores within the geographical limits of India.

Proposals in excess of the above limits as also in respect of risks out of India shall be referred to the "Market Agreement Committee" for rates, terms and conditions. Maximum ratio of limits of indemnity for any one accident to any one year is limited to 1:4 (i.e. any one accident: four times more for any one year).

3. Multiple units: More than one manufacturing unit located at different sites under single limits of indemnity per any one accident/any one policy period be covered.

4. Other locations to be covered: Besides manufacturing units, non-manufacturing locations, like head office, branches, warehouses, tank farms, etc. are also covered without extra premium.

5. Personnel to be covered: Officials, directors, employees, etc. are also covered even in their individual capacities without any extra premium.

6. Legal Expenses: Limits of indemnity includes legal costs and expenses incurred with prior consent of insurer.

7. Revision in sum insured: No provisions for increase/decrease are allowed in the limits of indemnity during the currency of the policy. However, within the same indemnity limits, additional limits may be included with retrospective date at inception of such inclusion in the policy.

8. Exclusion of risks: Liability arising out of natural calamity — act of God, viz. earthquake, storm, floods, etc. is excluded under the policy. However, it can be covered by payment of extra premium.

9. Jurisdiction: Jurisdiction of the policy is confined to India in respect of Public Liability Insurance.

10. Excess clause: There is a compulsory excess of 1/4 per cent with maximum of Rs. 1,00,000 for every claim. Further, provision is also made for voluntary excess with appropriate discounts in the premium with 15 per cent maximum on 10 per cent of voluntary excess.

11. Discount in premium: Provision is also made to give maximum of 25% discount subject to various favourable features, where the total premium under one policy exceeds Rs. 2 lakhs.

12. Claims: The policy is on "Claims Made" basis with usual retrospective date being the date of inception of the policy for the first time and continued to be renewed thereafter without break. As soon as any claim is paid, the aggregate limits of indemnity stand reduced correspondingly, reinstatement of aggregate limit is totally prohibited.

13. Classification of risks: The most hazardous industries have been grouped in Category IV and the least hazardous industries have been categorised under Category I.

14. Other features: a) Public Liability Policy cannot be issued for unlimited liability. b) Liabilities arising out and incidental to transportation of materials including hazardous/-dangerous substances can also be covered by paying additional premium. c) Standard Public Liability Policy can have a number of extensions such as liability for accidents arising out of fire and explosions, claims on account of defective sanitation, claims in respect of effluent risk and risk arising out of defective products. d) The rates of premium under this agreement are annual rates based on the limits of liabilities as well as the annual turnover.

15. Important points to note: 1. Risk group. 2. The selection of limit of indemnity is most important as the premium for Rs. 1 lakh indemnity and for Rs. 10 lakhs would be the same. Likewise, Rs. 25 lakhs and Rs. 50 lakhs would be the same. 3. To cover multi-units under single limit of indemnity instead of having different policies for different units. 4. More than one manufacturing unit located at different sites under single limits of indemnity per any one accident/a one policy period can be covered. 5. Premium for risk gro '1' is substantially less than risk group 2, 3 and 4. 6. Pu Liability risks are usually of low frequency but high se ity. 7. Additional premium for pollution cover varies fr 10% to 50%.

Risk group	Loading
1.	10% of the total premium
2.	15% of the total premium
3.	30% of the total premium
4.	50% of the total premium

8. The claim under this policy will be admitted within days from the date of expiry or cancellation of the policy notification of claims for accidents.

16. Risk assessment: For assessing the risks, Insura companies depute their engineers who carry out deta inspection and highlight the risk factors and the safety m sures adopted by the insured. The main points incorpor in the report are as under:

1. Nature of the manufacturing activity, location of risk particulars of surrounding property.
2. Type of products manufactured.
3. Surrounding population in the radius of 5 kms.
4. If any river/sea is situated nearby and whether the w is being used for drinking/fishing purposes.
5. General description and age of the building, plant machinery.
6. Particulars of storage tanks; such as, thickness, frequ of inspection, material with which made of and qua stored, etc.
7. Details of raw materials/finished products and sto thereof; details of manufacturing process of plants inc ing the method of affluent discharge and chemical t ment prior to discharge, back up system for main and machinery, details of hazardous and risks pro involved, details of transport system including loa unloading operations, transfer from tank to tank, ta tanker, incoming raw materials, out-going finished ducts, etc.
8. Details of lifts, elevators, cranes and movable mach within business premises.
9. House-keeping.
10. Safety policy of the company — whether any man booklet prescribed or not and how safety is enfo
11. Medical facilities, general safety and other protec
12. On site/off site evacuation and emergency plans (di planning).
13. Fire fighting equipment and how often fire drills, et carried out.
14. Chances of pollution and the safety measures ad Whether the plant is subject to regular inspection by ernment authorities as per the existing Pollution L the State or not.

MATERIALS MANAGEMENT

Part XII - Materials Handling (Contd.)

N.R. PAI

actors influencing material flow (Contd.)

. Travel distance

When material is moved between two successive points f use it covers some distance geographically. More the disnce, more is the dependence on handling procedures. Again ith the increase in the distance between use points followng factors come into play:

. Expenditure shoots up.
. There is a lowering of transfer efficiency.
. Possibility of goods transfer in good condition comes down.
. Time of transfer generally steps up. However this factor also depends upon the speed with which the transfer is effected.
. In-process material and hence goods in process step up.

Expenditure shooting up

Expenditure due to materials handling depends upon:
Equipment cost.
Labour expenses.
Operational cost of services employed e.g. usage of electricity or that of compressed air etc. needed to run these equipments.

Now, as the distance steps up, cost increases basically ecause of three factors:

Stronger and more powerful equipment is needed to effect the transfer. It costs more, affecting capital expenditure.
Labour has to be moved over greater distance which means more man hours spent per unit of work done resulting in expenditure rise.
Services like electricity required to operate. Stronger i.e. higher h.p. (horse power) equipments is more. It enhances working cost or operational expenses.

Lowering of transfer efficiency

As the distance between two operational points increases e material has to be moved for a longer time without being ocessed thereby bringing down transfer efficiency. Again ore the travel distance greater are the chances of moved aterial getting subjected to vibrational influences.

Possibility of goods getting damaged increases with stance

This stands as a corollary to point 2 above. More the disnce more are the chances of goods getting influenced by rces of vibrations, stresses and strains which in turn enhans the chances of their getting damaged during transfer.

4. Time factor increases with distance

As the time factor increases, the material is not available for next operational purpose for a longer time, thereby bringing down handling efficiency, because the purpose of material transfer is to render it available for the next processing operation. However this factor depends upon rate of transfer also. By using stronger and more efficient machines transfer speed can be enhanced to compensate for the travel distance. But then there is a limit to this speed of transfer and higher the speed greater are the chances of material damage during transit, as influences of vibration, stresses and strains on it are likely to step up. More powerful machines also raise the cost of buying and of operating them.

4. Movement direction

There are three directions in which materials can be moved. These are i) downwards ii) upwards and iii) horizontal.

Direction of movement plays an important role in deciding transfer efficiency and transfer cost. Again movement direction depends upon operation requirements and available facilities also. In moving material downwards, advantage of gravity is taken and gravity is a force available to any one at any time. It is free of charge and does not require any powered aid. Its only defect is it is unidirectional. In industry use of gravity is made with great advantage in gravity fed bins, certain conveyors and chutes.

The next preferred flow direction is horizontal movement. It requires muscle power or machine power for its operation and involves "push" or "pull". Use of wheels and rollers make this movement more efficient. Examples of equipment used are : carts, trucks, dollies etc.

The upward movement requires application of maximum force since this movement is against gravity. Much energy is required to overcome gravitational force. It has therefore low efficiency and high cost. It is least preferred and is resorted to as a last major or final alternative open to the materials man.

5. Flow magnitude

Amount of material handled per unit of time determines intensity of material movement. It is often described in terms of "flow loading" and is considered in terms of volume of material handled and frequency of this handling. Frequency determines "how often certain definite volume of material is transferred in a given period of time". In this respect the

main flow of materials handling function is to avoid bottlenecks (in production operations for example) by balancing the flow of material between two successive points of operation.

6. Allotted space

Plant layout borderlines the area within the framework of which the material movements can take place in a manufacturing plant. It is within this restricted area that material handling equipments and their functions must try to furnish material flow of the required intensity so that production runs smoothly, unhindered and again its preplanned speed is maintained, thereby keeping up the planned production schedule. The space ear-marked by plant layout then becomes the available space in a manufacturing facility which can be allocated to different manufacturing activities according to the priority of needs. It thus becomes clear that these different organisational functions compete with one another for space. Space, today is a very costly resource and has to be efficiently distributed amongst different equipments and functions. The materials handling function competes for space, firstly for its own requirements and secondly for carrying out the functions it supports.

Space is thus required as floor space for fixed or for equipments mounted on foundations, as an operating area like terminal turning space and lastly as an aisle room for mobile machines. It is also needed as overhead space for overhead operated equipments and machines. Aisle width should be broad enough to allow free flow of materials and easy movement of men. These movements should be with ease, with agility and without giving any chance of the accident because of enhanced proximity of men and materials to the machines fixed on foundations.

Today, space planning is a specialised job. Space is planned for shop floor with respect to manufacturing activity. Space planning is also needed to carryout physical supply efficiently and to effectively control movement planning for distribution.

With the rise in prices of land, utilisation of vertical space is today sought after by raising multistoried structures. They are constructions of choice as compared to sprawling single storey structures, since vertical space is made available thereby. However, with the multilevel facilities comes the use of powerful machines to lift materials at required heights. Such machines and equipments then become a "must". It then involves substantial expenditure by way of purchasing (the machines) expenses as well as by way of their operating costs.

7. Expenditure incurred

Materials handling cost is often shown as an indirect accounting expenditure in operations, in manufacturing, in distribution function or in physical supply activity. At time it is absorbed as the organisations general overhead charge Often this cost forms significant portion of total productic cost. It can even reach upto 50 per cent of total productic cost.

Systems employed in materials handling function

There are three systems commonly employed in materi handling function. These are: manual handling system machine handled systems and the latest computerised aut mated systems. In manual handling systems lot of empha is put on manual labour with little or practically no depe dence on machines. In mechanised systems we get a con bination of machine and manual handling. It is less labo intensive than the first one. In automated computerised sy tems, least labour force is required and the system is high machine intensive. Such systems are generally "tailor-made They are made to suit the particular required set of operatio

Selection of handling system

Selection of handling system is generally based on co benefit analysis. Generally automation is preferred wh materials can be repeatedly moved in high volumes in a fix flow path. This system eliminates manual supervision handling function. However the cost of materials handl forms a substantial portion of total product cost in this syste

Cost analysis

When analysed, materials handling costs come under f lowing heads: Purchasing cost of machines and equipme as also their operating costs. Expenditure incurred on lab and equipment maintenance. Today it is also a practice include under materials handling cost, loss incurred du machine downtime and due to wastage of man-hours.

Equipments available for materials handling

There are innumerable varieties of equipments avail to a materials manager and their selection has to be m carefully, looking to the amount of labour that can be sa cost of purchasing and of operating these equipments. A it should be seen whether they can fit in, in the space a able and whether there is any special purpose to which s an equipment can be put to use. The best way of stud them is to classify all the available equipments into m categories. We thus have the following categories:

1. Elevators and lifts
2. Tractors
3. Trucks
4. Conveyors
   and
5. Monorails and undertows

1. Elevators and lifts

These are specifically designed to carry out ver

wards and downward) movements. In this class we include sts, cranes and derricks also. Cranes and derricks are genlly provided with chains and cables to facilitate lifting. anes are generally movable from place to place while derks as a class are usually fixed in one place. We often find se in use in docks and shipyards. Pneumatic pumps are en used as lifting aids. Lifts and hoists can operate on eleccity or on hydraulic system by making use of Pascals law hydrostatic paradox. This is a cheap method and elimies use of power.

Tractors

These are wheeled vehicles and are often employed for ving goods on a variable path. They have the ability to h and pull. Generally they are powered vehicles.

Trucks

These are wheeled too, but they possess the ability to lift l carry the goods. Fork lift truck is the variety often met h. It also comes in a number of sizes and designs. Trucks y be powered or may be operable manually.

Conveyors

They are generally used when materials have to be moved ng fixed or sometimes along semifixed path. There are main varieties. The fixed or stationary surface conveywhich work on the use of roller coasters etc. over which material is moved and secondly conveyors with moving ace. They work on belts, buckets, slots or chains. Here material moves along with the moving surface on which placed for the purpose of transfer.

Monorails and underfloor tows

hese are useful in fixed path system. In monorails the erial is moved in a suspended position above the ground he predetermined path. Underfloor tows are usually hanically powered devices meant to push or pull wheeled icles.

ver and above these usual category of devices we also special systems to handle materials. This becomes a ssity when material handling assumes the integral part unction it serves e.g. in automatic production systems.

ction of handling equipment

is based on the following factors:

Expenditure in purchasing them.
Whether it can serve to the exact needs of the buyer.
Ease of operating it.
Spare parts availability.
Period over which it will be useful to the purchaser.
Any special purpose it can serve.
Minimum operating cost.
8. Risk of accident if any, involved in its use. i.e. safety outlook.
9. Ease of training operators.
10. Its maintenance expenses.
11. Whether it can be repaired indigenously.
12. Can it serve any special purpose or serve purposes other than the one for which it is purchased.

In general for continuous production systems fixed path for material flow is employed. This choice brings in the use of conveyors, pipes, monorails, underflow tows, chutes, lifts etc. It is worth noting that continuous material flow is needed in automatic computerised systems of manufacture. Such equipments are costly and their purchase and use is justified only in case of mass production, where equipment use is maximum.

However, in our country we still have intermittant production systems, at several places. We have lot of untapped manpower. Variable-path equipment is recommended in such cases. Dollies, tractors, trucks, forklifts are the equipments of choice here. These equipments are manually operated and need additional man power.

Here, it is worth noting that more the reliance on machine less are the mistakes and faults committed. Machines work faithfully. Human element is usually likely to cover up its mistakes quietly which is not the case with machines. Hence, there is lately a tendency to go in for equipment intensive materials handling.

While deciding on the equipment to be used for materials handling, the materials manager has to take into consideration, quantity of material to be handled at a time and also type of material that is being handled, whether it is corrosive, poisonous, hazardous (as some chemicals are), or fragile, shock-sensitive (e.g glass, electronic equipments etc.). Again he has to think about the path between two points within which the material has to be moved, as also the geographical distance between them.

Equipment availability

There are three ways of making available the required handling equipment. Materials manager can go in for outright purchase. However, purchase involves substantial funds and is justified only in those cases where the equipment bought is used for a sufficient length of time and during this time its full capacity is utilised.

The second alternative is to get the equipment on rental basis. This is preferred when forthcoming handling necessities are not certain, or enough funds are not immediately available, or lot of operational changes are anticipated in the near future.

The third alternative is to go in for lease. Generally with lease, contract vendor bears the responsibility of equipment upkeep as also of its maintenance. However, the user has to strictly follow the contractual terms of its use. Risk to the user is therefore minimum in this alternative.

Augmenting handling efficiencies

Apart from the use of the right equipment for materials handling it is important that handling efficiencies are maximised by the user. This is done by implementing the following points:

Maximised load that is carried every time by the equipment so that full use of its capacity is made. Minimise idle time of handling equipment. As far as possible, use of str
paths and avoid moving in reverse directions. Aisle are
should be optimised. Gravity should be used with advar
wherever possible. It has been observed that product la
enhances material handling efficiency.

Always one has to be on a look out for combining
two successive operations so that handling between the
automatically eliminated. Wherever possible integrate h
ling operation with manufacturing activity or with phy
supply and or with distribution functions. In the first
for example material gets processed as it is handled. I
also been found more advantageous to move material in
of men wherever possible.

,Science Briefs

AFE APPROACH' TO ACKLE CROP PESTS

"The use of pheromones for crop st management is an environmentally fe approach, and pheromones have en found to be effective in monitor- g pest intensity as well as trapping em to be destroyed eventually. More rious efforts should be made in the use pheromones for insect control as part integrated pest management strat- y," says Dr. T.R. Govindachari, rector of the Agrochemical Research bortory of the SPIC Science Foun- tion, Madras.

Although, there are over a million ecies of insects inhabiting the earth, ly about 200 or so are known to pose reat to agriculture. "Scientists in the veloped countries have succeeded in lating pheromones of over 100 insect ecies and such work has not been car- d out in our country so far. There is iew that there are differences in the io of pheromone components ween biotypes of the same species of ects occuring in different regions of world."

'It may be worthwhile for our sci- ists to investigate the pheromone nposition of insects that cause exten- e damage to cereals and other cash ps. We have just launched a research gramme to isolate, identify and estigate the pheromones of econom- ly harmful insects attacking major ps," he says.

rdisciplinary team

ests attacking important crops like , sugarcane and cotton will be exa- ed by the interdisciplinary team of archers at the laboratory. "We want etermine the pheromone composi- of these insects, and synthesise the ponents. Pheromones are of rela- ly simple molecular structure, and modern synthetic methods, it is to prepare these compounds," explains Dr. Govindachari.

The laboratory has done extensive work on neem derivatives. "We have made several formulations from neem seed kernel, and they have been standardised in terms of azadirachtin content. Azadirachtin is the most potent insect anti-feedant known till date, and it prevents feeding by a wide variety of pests even at a low dose of one nanogram per square centimetre. However, there are problems of stability and we are engaged in finding out methods of preventing degradation of this potent compound in the formulations" he points out.

There are also several other plant species, belonging to the families Meliaceae and Rutaceae, which produce similar compounds and they will be systematically studied for their anti-feedant activity, according to Dr. Govindachari. The laboratory will also undertake studies on specific anti-fungal compounds, which can effectively combat rice blast and rice sheath blight. "We intend to work on analogues of established antibiotics such as Kasugamycin and Validamycin, which are widely used in Japan to fight the dreaded disease of rice," he says.

Growth regulators

Besides developing insecticides and fungicides, the laboratory will also take up work on plant growth regulators of the type of 'Brassinolide' which is reported to have increased crop yields by up to 30 per cent when applied in extremely small quantities, according to him. The well equipped laboratory has already developed processes, on a pilot-plant scale in collaboration with the Central Leather Research Institute, for two fungicides Thiram and Ziram. "We have plans to work on some insecticides and herbicides of recent origin," he points out.

Discussing the difficulties in developing a new pesticide Dr. Govindachari says that it is a long drawn process involving huge sums. "It will roughly cost U.S. $20 millions, and several years of testing before a pesticide is introduced into the market. Out of 40,000 compounds tested for their pesticidal action, only one may finally enter the market. The odds are likely to increase in the years to come," he explains.

Most of the new compounds are not fundamentally different in chemical structure from the earlier compounds but have minor modifications in peripheral features. "It requires close collaboration between entamologists, microbiologists, organic chemists, biochemists and toxicologists to produce a new pesticide. Our knowledge of insect biochemistry is inadequate, and with better knowledge, we can develop compounds which will interfere, at crucial stages of insect development, by inhibition of key enzymes. Unfortunately such knowledge is not there to the extent desirable to design new effective compounds," he points out.

Multinationals' domination

The multinationals now dominate the research and development of pesticides, and as much as 80 per cent of the pesticides are produced by 15 corporate giants. No Indian company has ever developed a pesticide, because of the prohibitive costs involved. "Considering our country's progress in agriculture, we have to look ahead, and see how our scientists can effectively contribute to development of new methods of plant protection to enhance crop productivity," he says.

TUSSLE OVER PATENTING PLANTS

A recent European Commission directive on patenting of life forms, adds a new dimension to the ongoing tussle between the developed and developing nations over the inclusion of Intellectual Property Rights within the framework

of the General Agreement on Tariffs and Trade (GATT).

The EC directive represents an effort to extend patent protection to all forms of genetically altered life, including plant and animal varieties. It proposes a considerable strengthening of the existing system of protection offered under Plant Breeder Rights (PBRs).

Upov convention

PBRs are governed by the 1961 Convention of the International Union for the Protection of New Plant Varieties (the Upov convention). This convention stipulates that new plant varieties developed by any breeder could only be utilised subject to a licence being obtained from him. But to protect against any intrusion of monopoly elements, it provides for two kinds of exemption — breeder's exemptions and farmers' exemptions.

Plant breeders seeking to develop new varieties using the protected variety are exempt from the licensing clause of the Upov convention. So too are farmers, who harvest a part of their produce for recycling as seeds.

The EC directive seeks to end both these exemptions. Article 12 of the directive seeks to extend patent protection not only to "the product initially obtained by the patented process, but also the identical or differentiated products of the first or subsequent generations obtained therefrom. "Similarly, Article 13 stipulates that the patent would be applicable to all products in which the genetic information pertaining to a patented product has been incorporated, when it can be argued that such information is of "essential importance for its industrial applicability or utility."

Influential lobby

Further consideration of the EC directive has been deferred on account of resistance from the influential European lobby of plant breeders and agriculturists. The traditional seeds industry perceives in the directive, an effort by the large private corporate sector to consolidate its position in the seeds business.

The EC directive is seen as introducing an asymmetry in the relation between the corporate sector and the traditional plant breeders.

While the corporate sector could, using the breeders' exemption, draw upon the species available with traditional plant breeders, the latter could not do likewise for varieties developed in the corporate sector.

In a defensive response, plant breeders in Europe are proposing the modification of the Upov convention, so that "where a variety is essentially derived from a protected variety, the owner of the protected variety may prevent all third parties not having his consent from exploiting the derived variety."

Loss for Third World

This would bring PBRs almost on par with patents in terms of exclusive monopoly control over plant varieties. For developing nations, this could imply a loss of food security, and an accelerated process of erosion of plant and animal genetic resources.

The EC directive has the potential for serious consequences in the context of the recent liberalisation of seeds import policy in India. An assertion of monopoly control over plant varieties in the context of liberalised imports, could impede the attainment of self-sufficiency in food, and also put paid to hopes of developing an indigenous seeds industry, attuned to the situation prevailing in the country.

UNDERSTANDING GENE ALTERATIONS THAT CAUSE CANCER

Researchers have found that as many as ten distinct mutations have to accumulate in a cell before it becomes cancerous.

The researchers have found that t changes affect the cellular oncogen activating them so that they can dr the increased cell growth and ot abnormalities characteristic of can cells. But that is apparently not su cient for the development of full mal nancy.

The changes also include the loss inactivation of two, three, or even m "suppressor genes", which presumal work normally to inhibit cell grow

The cancers in which these extens gene changes occur includes the m common ones — the cancers of lung, colon, and breast, which toget account for about 40 per cent of human malignancies. The identifica of the mutations underlying these ca ers may aid efforts to prevent, diagn or treat the malignancies.

Analysis of the gene changes tumour cells may also improve cl cians' ability to predict how their ca patients will do, helping them iden malignant tumours. Researchers trying to do this by looking at chan in individual oncogenes, but these dies have sometimes led to conflic results. Some investigators have fo that a particular change indicates a p prognosis, while others have faile confirm such a link. Observing sev genes, instead of just one, may more accurate predictions.

In addition, researchers hope understanding the gene alterations cause cancer may help in the desig better treatment. If all the mutations are seeing are in fact necessary cancer to develop, then this may hopeful message from a therapy v point.

The gene changes usually occ specific order, but there are except The journal quoted a researche saying that "it appears that it is

cumulation of changes, not the specific order, that is important for cancer velopment". One of the genes altered the RAS oncogene (first identified in virus that causes rat sarcomas) which ten undergoes an activating mutation out midway in colon cancer development.

But most of the other gene changes tected by the researchers are deletions specific segments of certain chromosomes, principally numbers 5, 18 and . These most likely result in the loss genes that could otherwise suppress mour growth, it quoted a researcher saying.

Researchers at the Johns Hopkins iiversity have so far identified only e of their suspected suppressor genes. ey have found that the deleted segnt of chromosome 17 carries a gene signated p53 that encodes a protein h known tumour-suppressing activ- (p53 gene has a protein product with lecular weight of 53,000).

Loss or inactivation of the p53 gene y in fact contribute to the development of several common cancers. searchers have found that the gene is quently missing or abnormal in lung cer cells. It is also true for breast cer cells.

However, while some gene changes y be common to the different cancothers are not. For instance, deles of chromosomes 3 and 11 also ir frequently in lung cancers, but not olon cancers. And conversely, the nosome 5 and 18 deletions are d frequently in colon cancers, but in lung cancers.

he fact that so many mutations are led for cancer development shows cells normally control their growth closely with multiple sets of checks balances.

e findings are also consistent with epidemiology of colon, lung, and breast cancer, all of which occur most commonly in middle age or later. It takes time to accumulate the necessary burden of mutations, and this may mark a point of difference between these cancers and those that develop early in life.

At present, however, researchers have more questions than answers about what all the gene changes seen in cancer cells mean to either normal or cancer cell biology, it said.

-- P.T.I. Science Service, February 1-15, 1990

RESIDUAL-OIL GASIFICATION PLANT TO GENERATE ELECTRICITY

The first power station in the world to generate electricity from residual oil will be built at Brofjorden, north of Gothenburg of Sweden's west coast, according to the Swedish State Power Board.

The plant, which will produce more electricity in relation to the amount of fuel used than similar installations and, at the same time, minimize emissions into the atmosphere, is scheduled for start-up by 1994.

Approximately half a million tons a year of contaminated residual oil from the nearby Scanraff refinery will be put to better use in the new plant. Containing about 4 per cent sulphur, it is currently exported but some of it is "re-imported" in the form of airborne pollution.

The Brofjorden power station will emit only about 100 tons of sulphur into the air, compared with an estimated 20,000 tons from the residual oil now being exported.

The technique to be used is called oil gasification with combined cycle, already used in hundreds of chemical industries globally but never before for producing electricity. With this method, residual oil is fed into a pressure vessel together with oxygen produced in a separate plant. The oil is converted into gas under high pressure at a temperature of 1,400 degree C and the resulting gas contains carbon monoxide and dioxide, water vapour and hydrogen gas. The gas is cooled in a heat recovery system and the heat is then converted into steam.

In a subsequent stage, the gas is cleaned from dust and sulphur and then burnt in a gas turbine connected to a generator. Before being led to the chimney, the flue gases are cooled in a special boiler generating steam, which is mixed with the steam from the gas cooler and conducted to a steam turbine. Both the gas turbine and the steam turbine produce electricity.

As much as 95.5 per cent of the sulphur can be removed from the residual oil. The recovered pure sulphur can be sold to the chemical industry. Carbon dioxide cannot be completely eliminated but much less will be produced with the new system then with conventional oil or coal firing.

Electricity production at Brofjorden is estimated to exceed 2 TWh (Tera Watt Hours) per year, approximately 1.5 per cent of the total electricity consumption in Sweden. The station's output will be about 350 megawatts, or roughly one-tenth of the total output from the Ringhals nuclear power station, south of Gothenburg. This will be a welcome addition to the power grid, when nuclear energy is phased out in Sweden, a process which is to be completed by the year 2010 under current energy legislation.

Unlike conventional heating and power plants, the Brofjorden power station will encompass a blend of building, installations, tanks, tower and chimneys, more resembling a chemical processing plant. The cost of the project will be in excess of Kr.3 million (480 million dollars), which represent the largest single investment in Vattenfall's ten-year plan.

When it goes on stream, it could replace part of the production lost if one reactor at Ringhals and one at the Barseback nuclear station outside Malmo are closed in the mid-1990s. The station will employ some 200 people.

DIAMOND FILM POLISHING APPARATUS

Synthetic diamond film from the gas phase is expected to be used as a new method to improve surface hardness. When applied, however, it is necessary to polish it because a diamond film synthesized from gas has a rough surface. Adhesive strength between the film and the substrate is too weak to withstand the force produced by conventional polishing methods using diamond powder and some new method was required to polish the diamond film generated on the substrate.

Prof. M. Yoshikawa and Dr. Yang, Tokyo Institute of Technology, have developed a method to polish diamond film using the thermo-chemical reaction between diamond and iron, and have manufactured a polishing apparatus for trial.

A diamond film deposited on a 7x7x4 mm silicon substrate by microwave plasma CVD is used as the workpiece, and an iron plate heated to 810 degrees celsius is used as a polishing plate. A polishing pressure of 60kPa was applied, which is much lower than that of the conventional method.

The polishing is performed in a hydrogen gas atmosphere. After two hours of polishing, the diamond surface becomes smooth without any exfoliation. Meanwhile, Fujitsu Ltd., has developed the thickest diamond film so far by the vapour growth method, which is 10 mm square and has a thickness of 2 mm using the DC plasma jet CVD method.

The high-speed growth and large area was realized by cooling the substrate with water to allow for rapid cooling of plasma so that a large amount of high-density plasma could be generated but only the diamond structure could grow using the vapour phase method based on the principle of the DC arc.

The DC plasma jet CVD method changes a mixed gas of hydrogen, argon, and methane into plasma by DC discharge and sprays the substrate with this plasma gas at high temperature while flushing away vapor. Usually, plasma graphitizes the ground diamond because of its high temperature and it does not accumulate diamond continuously and easily, but when the substrate is cooled with water from its rear side, the plasma is rapidly cooled and changed to diamond.

The National Institute for Research in Inorganic Materials has also succeeded in fabricating a diamond thin film with a large area of 4 inches in diameter. The successful method by the National Institute uses microwave plasma CVD to enable a thin film of 5μm thickness to be fabricated with homogeneity and reproducibility. Methane with a concentration of 1 per cent or less was used as the raw material to generate an 800 degree to 900 degrees celsius plasma with a 500W-output microwave for vapor growth of diamond on a silicon substrate under reduced pressure. The National Institute has developed a system that uses two 1.5kw microwave generators in a horizontal pair which can move the position of the generated plasma by controlling the output of each microwave generator. By using this system, the large area was achieved. The plasma is 30 mm wide and it moves in the direction of width. Since the generated plasma is very stable, it allows homogeneous diamond to grow. The National Institute could fabricate a diamond thin film at a growth speed of 0.2 μm per hour by providing 100 to 200 cm^3 (about 1 per cent methane concentration) per minute. This thin-film diamond is multicrystalline, but it has a specific gravity of 3.52 and a hardness of 8 kg. per cm^2, which is similar to natu diamond.

-- P.T.I. Science Servi
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ANTI-CORROSIVE COATING THAT DRIES UP UNDER WAT

A new anti-corrosive coating de oped by Soviet scientists makes it p sible, among other things, to paint bottom of a ship while it is afloat

The coating, ESLAN, is applied the surface to be protected by the u techniques — by brush, roller sprayer. The coating is capable of h ening not only in air but even u water and is therefore, indispensabl anti-corrosive treatment of wet surf

A range of such coatings have b developed to protect industrial st tures, assemblies and structural m bers from an aggressive chem environment. Conventionally, common epoxy coatings to harden surface to be protected must have a moisture content, and to be at a perature not lower than 15 degrees sius. ESLAN, on the other h hardens under a wide range of tem atures (depending on the choice an their range), the lower limit being m five degrees centigrade. To protect dings and housing industries aggressive chemicals a laborious cess involving linings from resistant bricks is normally made u ESLAN on the other hand is claim dispense with such speical mas The material that replaces brick li is applied in several layers, the thickness never exceeding one metre. ESLAN withstands a sul acid concentration of 50%, hydroc acid upto 36%, nitric acid upto and is also immune to petrol and o solvents. It blends with protecte concrete surface, entering its por sealing its cracks.

-- P.T.I. Science Se
February 1-1

New Products

ORGED Y-TYPE STRAINER

Gold Technomark offers Forged Y-pe Strainer for effective protection of peline systems against damage from reign matter in flow stream. Bodies nd flanges are designed to provide aximum strength and are machined om Solid Forgings suitable for heavy ities. The Forgings are rigidly spected and heat treated to provide the iique properties required in process idustry. Forgings of ASTM A105 are ually strong at normal temperatures d possess exceptional strength and eep resistance at high temperatures. It fers excellent resistance to erosion and scaling at temperatures upto 1100°F.

The Strainers are designed for large t open area and the screens have wire esh supported with perforated sheets r high burst strength. The fine mesh strainer screens are spring pressed to eck bypass of unfiltered liquid. Strairs are compact and easy to maintain.

The strainers are designed for high rt prevention capacity, low pressure op and high filteration efficiency. Size nge are 15mm to 50mm in materials forged carbon steel, stainless steel 4, 316 and 316L. Mesh materials all be of SS 304, SS 316, SS 316L, onel and other exotic materials. Ends of socket weld/screwed BSPT/ rewed NPT.

The unique guarantee policy to pply spare mesh at a nominal extra st after the prescribed period implies, effective life of the strainer is as od as the pipeline itself. The design ds distinct end use in protection of mps, meters, compressors, boiler bes, heat exchanger tubes, nozzles, eheaters, etc. Wide application exists r Forged Steel Strainers in refineries, trochemical and fertiliser, PFY/PYT ants, chemical and pharmaceutical ants, paper and pulp, sugar industry, clear and thermal power plants, distillery, brewery, paint industry etc. For further information write to: Gold Technomark, P.B. No. 3483, Anna Nagar, Madras - 600 040, Ph: 654 807, Telex: 041-24060 WDT - 041.

HI-TECH GAS MONITOR INCREASES SAFETY IN COAL MINES

The neotronics Exotox 40 OFC "three in one" gas monitor has been approved by the Director General, Mine Safety (DGMS), for use in Indian coal mining. Manufactured by Neotronics Ltd. of Bishops Stortford U.K. and marketed by Spantech India Pvt. Ltd. of Calcutta, the Exotox 40 measures and alarms for critical levels of oxygen, carbon monoxide and flammable gases simultaneously.

The process of certification involved performance testing by the Coal Mining Research Station and long-term satisfactory use in very gassy coal mines.

With the DGMS approval, Indian coal miners will now be allowed to carry underground the Exotox 40 OFC, thereby eliminating the risk factors from dangers of explosion and toxic gases.

By obtaining this certification, the Spantech Group have again demonstrated their success in bringing world renowned health and safety monitoring instrumentation into India.

PORTABLE, BENCHTOP X-RAY FLUORESCENCE ANALYZER

A new, portable, bench-top instrument, the ASOMA Instruments Model 8620 X-ray Fluorescence Analyzer, is offered for quick, quantitative measurement of atomic elements (Aluminum through Uranium) in foods, pastes, foams, films, coatings, suspensions, slurries, liquids, solids, and powders.

Eliminating all of the time consuming and costly "wet chemistry" manipulations associated with other methods, a sample is simply poured into an analysis cup, placed in the instrument, and measured (with results automatically calculated and reported on the 8620's integral printer and LCD display). Easily operated by non-technical personnel, the instrument is designed for diverse use, from mines to the production floor or laboratory.

The 8620 can be configured to measure up to six elements simultaneously. Many calibrations can be stored to accommodate the wide variety of sample matrices encountered in a multi-product operation. Elements can be measured in the ppm to percent range, quickly, and with unmatched precision.

A choice of sources and detectors is available (for optimum sensitivity and precision), and a built-in printer and a RS232 output are standard features. In addition, a variety of optional equipment is available for the 8620. The two most popular options include a multichannel hardware/software package (to connect the 8620 to an IBM-PC compatible computer) and a hand-held probe for measuring large or hard-to-reach samples. For further information, contact: Multiflo Engineers, W-30, MIDC Industrial Area, Phase II, Manpada Road, Dombivli (E), (Via) Bombay -421 204, Tele: (0251-86) 5184.

MOULDED POLYETHYLENE 20,000-LITRES MIXING VESSEL

A Gujarat-based firm, Sinter Plast Containers, has introduced for the first time in India a moulded polyethylene processing or mixing vessel of 20,000 litres capacity. Made in one tough piece without any joints, seams or welds, the new sintex vessel is expected to be an ideal substitute for the wooden, lined and fabricated plastic vats for use in dyestuffs, paints, pharmaceuticals, food processing, chemicals, oil and similar industries. The new product is leak-

proof extremely durable and completely stress-free. It is also readily usable as there is no problem of swelling and shrinkage as in the case of wooden vats. It is resistant to most acids, alkalies, chemicals, vegetable oils, foodstuffs and most pharmaceuticals.

The 20,000-litres capacity vessel is provided with two manholes, one for the stirrer arrangement and the other for side inspection. It has a tapered bottom for virtually 100 per cent discharge, and is cheaper than wooden and lined vats of similar capacity.

-- P.T.I. Science Service

X-RAY OPAQUE POLYERSTER FIBRES

Textile engineers at the Indian Institute of Technology in New Delhi have developed a composite polyester fibre that is opaque to X-rays and has potential applications in medicine and surgery. The X-ray opaqueness is imparted to the polyester by blending it with barium sulphate, a compound known for its opacity to X-rays. According to R. Jain, a textile engineering student at IIT, 30 per cent of loading with barium sulphate in polyethylene terephthalate (PET) is sufficient to produce X-ray opaque polyester fibres.

Jain working under Professor P. Bajaj, used a titanate compound as a coupling agent to improve the processibility of the polyester and the barium sulphate. The coupling agent improves compatibility between the organic polyester molecules and the inorganic barium sulphate molecules, said Jain.

Changing the concentrations of the coupling agent in the fibres could help improve the tensile and mechanical strength of the fibres, Jain said. The researchers believe such fibres could have a wide range of uses in medicine including the production of surgical swabs and sutures for use during and after surgery. The opacity of the fibres will help easy monitoring of internal sutures following surgery.

-- P.T.I. Science Service

ELECTRONIC WEIGHING SCALE

Omega electronic scales are favourites in industry because they can be depended upon for quick, accurate readings which never deviate more than ± 0.05%. And are indicated through bright L.E.D. digital displays for added convenience. Manufactured indigenously under strict quality control supervision, Omega scales can take any amount of rough handling without showing any snags in accuracy. Moreover they are backed by prompt after-sales service; ever available within 24 hours.

Solid state and easy to maintain, Omega Industrial electronic weighing scales are available in a vast range of models, ranging from table top and platform scale models to mini-weigh bridges with capacities upto 10 tonnes. Omega also has a number of beneficial optional features to offer, namely, flame proof indicators, facilities for indicators at a distance of upto 12 metres, RS232 interface for computers, numeric roll printers, set point, facilities and counting facilities. For details contact: Universal Electronic Scale Co., 27 Tamarind Lane, Fort, Bombay 400 023.

AUTOMATION IN COSMETICS

The use of cosmetics has grown several fold in the Indian market with the rise in the standard of living and fashion consciousness. Several of the products that were once manufactured and packed manually had to automated. Now not only has production gone up, so has quality, and with the result that Indian cosmetics today find a ready market overseas. Shampoo, nail enamel, and kajal are some of the products that have seen automation in their packaging.

Shampoo is filled on a volumetric piston filling machine, at speeds of 10 heads per minute, depending on the p duct. Accuracies of /+ 1 ml over range from 100 ml. to 1000 ml. h been consistently achieved, with foaming.

It is for the first time that a mach has been built in India with the meas head mounted directly on the fi bowl, this prevents the use of f tubing and pipes that cause a sanita nightmare. The filling valve can easily be dismantled for cleaning, opening a single nut. Precision engi ering eliminates variations from one ling valve to the next.

Safety controls have been given priority; a no bottle no fill system been introduced, together with a t level controller that starts a proc pump once the level drops.

This machine is capable of fillin range of bottles from 60 to 180 ml, w the necessary change parts. The d can be set with infinite variation b single hand wheel, that sets all the c inders simultaneously.

A long feed screw helps the cor orientation of the bottles, the bo enters the filler through an infeed spi and exits through an outfeed spider to a conveyor. This is linked to an au matic cap placing and screw capper. details contact: Hilden Packag Machines (P) Ltd., Plot 101, Road MIDC, Andheri (East), Bombay 093.

RING SOCKETED PVC PIPES

Finolex Pipes Ltd., the leading m ufacturers of a range of rigid PVC p and fittings have recently launche revolutionary new product — Fin "Ringtite" PVC pipes and fittir Manufactured in a most modern pl Finolex 'ringtite' pipes offer all advantages of conventional PVC p and more. The additional advantage 'ringtite' pipes are: ease of joint Accommodation of pipe expansio

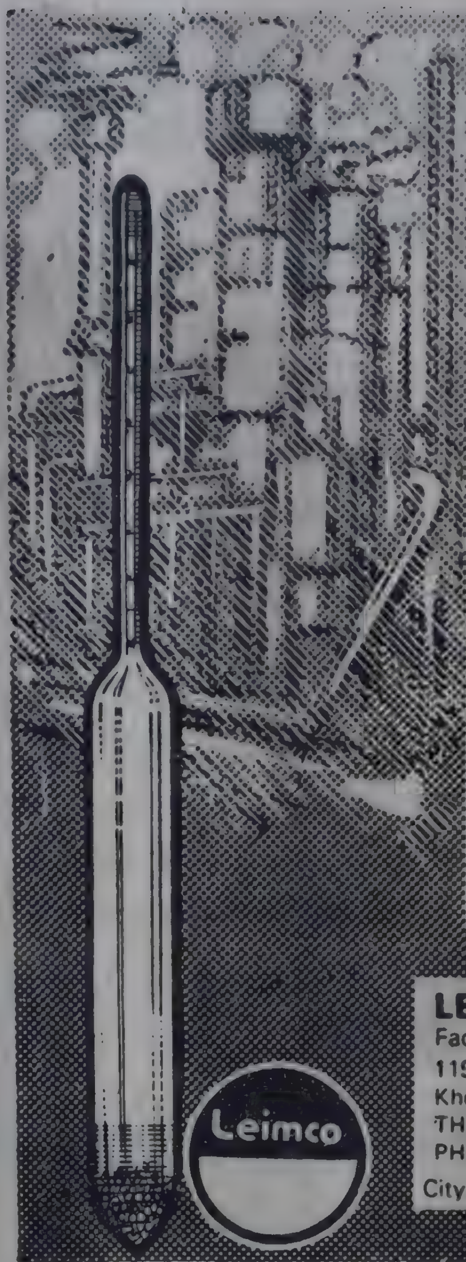
ntraction, perfect leakproof jointing, l consistent quality of pipes, fittings l joints. Finolex 'Ringtite' pipes are oplied with a specially designed elas- neric sealing ring. The ring design sures easy jointing without the use of e traditional PVC solvent cement. ace inserted the joint is totally leak- oof and the pipeline can be tested mediately saving time and effort. For ails contact: Finolex Pipes Limited, urketing Division, P.O. Box No. 4, inchwad, Pune-411 019.

W VACUUM INSULATING ATERIAL ON SILICA BASIS

Degussa AG, of Frankfurt am Main, developed a new vacuum insulating terial on silica basis. The new insu- ng material exhibits excellent insu- ng properties (6-8 mW/m/K) and go- lurability with the added benefit that s manufactured without the use of pellants and is ecologically and tox- ogically completely safe. The man- cturing process for vacuun lation panels (VIPs) involves pres powdered silica into panels an ing them with a special film unde num. VIPs can be produced accord to the required measurements an riable thickness, up to a size of 6(x 80 cm.

IPs are particularly suitable for use frigeration appliances. While initial ulations indicate that the costs for insulation will be higher than for entional materials, the price differ- will be compensated by the energy ng achieved throughout an applian- operating life. Capacity of a devel- nt scale plant already in existence gussa permits anyone interested in menting this material to be sup- with a sufficient no. of samples.

production plant with an annual ity of several million panels is cur- being planned. For further details ct: Degussa AG, Postfach 110533, 00 Frankfurt 11, Telephone (069) 860 or 218-2230.



Leimco

News about New Projects

P AWARDS ACRYLO PROJECT .DDS TO POLYBUTENES

BP Chemicals has awarded Ralph M arsons the design engineering work on s long-awaited UK acrylonitrile pro- ect. The location for the plant is elieved to be a choice between Gran- emouth and Teesside. An announce- ient on this is imminent, says BP.

It confirms the plant's capacity will e "in the region of 270 000 ton/year," s previously suggested. The technol- gy being considered is the BP/Sohio uidized bed process, not the new BP hemicals Inc. process which is direct om propane. An onstream date of 993 is envisaged by the company.

BP already produces acrylonitrile in e UK, at its 70,000 ton/year Grange- outh plant which has been running nce 1972. Grangemouth is also the site the UK's only ABS plant, which is ased on acrylonitrile feedstock. The ant is owned by GE Plastics and is elieved to have a capacity in the region 50,000 ton/per year.

BP is also pushing ahead with a £ 5m ($24m) programme of polybutenes odernization and debottlenecking. The st of three stages, completed by ecember 1989, is the expansion of pacity at Lavera, France, by 10,000 n/year to 50,000 ton/year.

In a second stage, BP's Grangemouth lybutenes capacity will be upped, th full commissioning scheduled for 1990. When this comes on-stream 's total polybutenes capacity will be the order of 100,000 ton/year, cov- ng Lavera and Grangemouth.

The third stage of investment centres a feasibility study, due for comple- n in 1990, to determine the optimum ation for a further expansion. This ll be either at Lavera or Grange- outh, according to a BP spokesman. No idea of the scale of expansion has been given. BP's Grangemouth ethylene expansion, due on-stream in mid-1992 will increase availability of the C4 feed- stock used in polybutenes production.

SHELL PLANS PET PRODUCTION

Shell has made its first step into the polyethylene terephthalate (PET) busi- ness with the formation of a manufac- turing joint venture in Italy and has confirmed it is looking at other PET projects in Europe.

Its Italian arm, Shell Italia, has teamed up with an Italian industrial con- cern Mossi & Ghisolfi (M&G) in an 85:15 venture to construct and operate a PET base grade resin plant with a capacity of 60,000 ton/year. The joint venture, named Societa Italiana Polie- tilene Tereftalato SpA (SIPET) is investing L100bn ($77m) in the plant to be built at Frosinone, south of Rome.

The plant will be based on Zimmer technology and the German company will also handle engineering. Contrac- tors will be invited to bid in the next quarter, according to Shell Italia chem- ical manger Dino Chelli. He stressed that Shell will supervise construction.

Mossi & Ghisolfi is involved in poly- mer manufacture and processing as well as engineering and construction. It has a majority share in Cobarr, a manufac- turer of PET packaging grade resin, pre- forms and bottles.

Output from SIPET's plant will be converted to PET packaging grade resin at the Cobarr plant. Shell's 85 per cent share of this will be marketed by Shell Italia in Italy and by other Royal Dutch/Shell companies in the rest of Europe and overseas. M&G's 15 per cent quota will be used for bottles and preforms.

Shell is considering other PET plants to reinforce its "packaging strategy". One seems likely for Spain, and another elsewhere in Europe. Chelli was unable to comment on where these plants will be. But, when asked about possible capacities for these he said, "As far as I know this (Italy) is the biggest, the others could be half as big."

PS BOOST FOR MALAYSIA

Petrochemicals (Malaysia) is to build a third polystyrene plant. The announcement comes a month after the company commissioned its second PD plant and will up output from 10,000 ton/year to 30,000 ton/year.

Chairman Osman Ahmad says the new plant is expected to be built on a 109 hectare site in southern Johore state by 1992. An investment figure for the project has not been released, though Idemitsu Petrochemical, which has a 37 per cent stake in Petrochemicals Malay- sia, will "assist."

Osman expects his company's turn- over to treble to about M$ 100m/year ($38m) when the third PS plant is ope- rational. The company's second plant, now on stream, is for high impact PS. It employs Idemitsu technology, as will the third. The first PS plant is a com- pounding facility. More than 80 per cent of total output is sold to free-trade zones in Malaysia.

PHILLIPS UNVEILS PLAN FOR MORE PE

Phillips 66 meant business when it said it was going to get its polyethylene operations back on the rails following an explosion and fire which destroyed all its hdPE capacity at Houston, Texas. The company is to build a second new polyethylene plant at the site in addition to plans announced in November 1989.

The 272,000 ton/year plant is expected to come on-stream in July 1991 and construction will start immed- iately. This, coupled with the

136,000 ton/year unit due on-stream next July and the expansion of that to 272 000 ton/year in October 1990, will bring the Houston hdPE capacity to 544 000 ton/year by July 1991.

The 544,000 still represents a shortfall of 182,000 on the pre-October capacity of 726,000 ton/year at Houston. The Phillips 66 board is expecting to finalize further plans on replacing the difference in the first quarter of 1990.

NOVA MULLS MTBE JV

Canada's Nova and Venezuela's Pequiven and Eni subsidiary Ecofuel are getting their heads together over the possibility of a methanol/MTBE joint venture in Canada and Venezuela.

The project, so far unnamed, would hinge on Nova's existing 900,000 ton/-year methanol complex at Medicine Hat, Alberta, and a proposed 660,000 ton/year plant currently being built at Jose, Venezuela, due on-stream in 1992.

The combined methanol output of 1.6m ton/year would be used to produce 1m ton of MTBE. The plant projected for Sarnia, Ontario, would produce 500,000 ton/year MTBE, with a start-up of 1992 and costing Can$150m ($129m). The Venezuelan MTBE project is for a plant of the same capacity slated to come on stream in 1991.

EUROPEAN MA VENTURES BEGIN TO TAKE SHAPE

Eight maleic anhydride (MA) projects in Europe are planned to come on stream between now and the end of 1992; four of them are joint ventures. Their future is highly dependent on the development of captive outlets such as butanediol, says Chem Systems principal consultant Chris Peacock.

Half of Europe's current MA output is used to make unsaturated polyester resins. The next largest end-use is in food acids (fumaric and malic acid). Less significant are agrochemicals, lube oil additives, alkyd resins and a wide spectrum of others. The overall growth rate for these 'conventional' end uses is 3-4 per cent/year over the next five years, reckons Peacock.

In recent years MA demand has been boosted by acrylic-maleic copolymers used in detergents. A new end use with great potential is butanediol. Others are currently being developed.

DSM's joint venture with Alusuisse Italia, announced last spring calls for a 40,000 ton/year plant in the Netherlands, probably the Rotterdam area, according to Alusuisse's licensing manager Domenico Pedretti. Final discussing are underway on the structure of the JV and plans could be finalized in February, says Pedretti.

The plan, which will probably come on stream in late 1991, will use the Alusuisse/Lummus Crest Alma process based on fluidized bed technology and using n-butane feedstock. As the largest producer of unsaturated resins in Europe, DSM would have captive demand for its share of the output.

Alusuisse has an MA project of its own — a 50,000 ton/year plant at Ravenna, Italy. Pedretti denies rumours that environmental objections have forced the company to seek another site for the plant. "Our firm intention is to establish a new plant in Ravenna," he says. The original start up date of 1990 has been set back to the end of 1991, however due to delays in local, regional and national authorization.

The plant will be based on the Alma process. Lummus Crest will handle basic engineering. Detailed engineering will be done by Alusuisse. Product from the plant will largely be used captively, says Pedretti. The company produces about 50,000 tons/year of unsaturated polyester resins at its San Giovanni Valdarno site. On top of this Pedretti says Alusuisse's R & D department is actively looking at the new applicatio The possibility of building a butaned plant is under consideration, he sa

Italy's Polioli, a producer of form dehyde, various resins and polychlo prene adhesives, is set to commission MA plant in Vercelli this year. The f line will run in May and a second at year-end. The plant was actually in o ration six years ago at Porto Tor Sardinia, under the ownership of Sc eta Italiana Resine (SIR). Polioli bou it from Enichem in 1988 and transf red it to Vercelli in 1989. It upgraded the plant in an investmen approximately $15m, changing react compressors and dehydration un Euteco provided the plant's origi technology, but Polioli has upgrade so that either line can run on benze with a capacity of 125,000 ton/year the more fashionable butane wit capacity of 9000 ton/year. Pilioli g eral manager, Antonio Moro says: " are sure we will be next in line to s up." Part of the output will be used c tively to make polyester and o resins. The rest is expected to be s to customers in northern Italy.

Another Italian firm, Sisas SpA expanding capacity at its plant in Fel Belgium, Current capacity of 25, ton/year is being hiked to 70,000 'wi 1990'.

PAKISTAN CONFIRMS FERTILIZER UNITS

The Italian engineering comp Snamprogetti has confirmed it is build a turnkey fertilizer complex fo Fauji Fertilizer Co, at Goth Ma Punjab state, Pakistan. The turnkey c tract, for 330,000 ton/year ammonia 577,500 ton/year urea, is worth m than $250m, and was won against ir national competition.

The project will use Snamproge urea and Haldor Topsoe's amm technology. Snamprogetti says the c plex will be operating by the en

92. The unit will help meet increased al demand for nitrogen fertilizers, ich are expected to fall short by 2m in 1992. Meanwhile, at Port Qassim, ar Karachi, the National Fertilizer rp. of Pakistan and Jordan Phosphate ines Co. (JPMC) are planning to set a $57.5m fertilizer plant. If granted vernment approval, the joint venture ll produce 330,000 ton/year triple perphosphate.

France's Krebs & Cie, consultant to e project, has submitted a feasibility idy to the National Fertilizer Corp. hich is in negotiations with the Pak-an government. JPMC is to supply osphoric acid to the plant at 75 per nt of the international market price. e government is believed to have ocated a $37.4m foreign exchange nponent.

ADET PLANS LAB

The Arab company for Detergent emicals (Aradet) is studying a plan ncrease linear alkyl benzene (LAB) acity at Baiji, Iraq. The US's UOP, ich supplied the original design and hnology for the 50,000 ton/year nt, is currently undertaking a study wing for revamping and debottle-king of the plant. A spokesman for det said it was likely that UOP and y's TPL — the original engineering tractor — would carry out the ansion work. Sources say the expan- will help Aradet to maintain its e of new markets.

C COURTS BID

an's National Petrochemical Co. C) intends to build a new fertilizer plex in Khorasan province, north- ran. The estimated $250m project comprise units for 247,500 ton/year onia, 330,000 ton/year urea, 89,100 ear sulphur-coated urea and 66,000 ear agricultural grade sulphur. ers are out for the complex and hopes to begin construction in mid for completion around three years later. All products from the plant will be used in the north of Iran.

WINNERS EMERGE FOR BRAZIL'S ITAGUAI COMPLEX

Shares in Brazil's Itaguai petrochemicals complex have been finalized. The strongly contested 200,000 ton/year PE unit has gone to PoliRio, an association of Mariani, Andrade Gutierrez and Monteiro Aranha (50:25:25), which submitted a bid of $50.1m for preferred stocks. PoliRio's $183.6m plan will use BP technology.

In PP, Polibrasil (Petroquisa 33.2: Shell 25.4: Suzanol 4.5: Cevekol 14.5: Ipiranga 10.5 and minor holders) has emerged the winner, with a $50.2m bid for preferred stocks. Polibrasil's investment, including $8.3m for common stocks, is $183.6m. The 100,000 ton/-year plant will use Shell's Lippshac process.

The 150,000 ton/year chlorine/caustic soda and 180,000 ton/year VCM/PVC complex has gone to EPC (Norclor 25: Occidental 25.5: Sarra 22.5: Icatu 22.5: Joao Fortes 5), which made a $22.1m bid. The integrated project will be based on Occidental's latest technology. Estimated erection costs are $460m, excluding the mandatory $17m for common stocks.

All the other projects, which were through the first qualification, remain approved. The complex should be operational by 1996.

The expansion of the Copesul cracker at Triunto will take place after Itaguai, says Ernesto Carrar, secretary of the IDS (Industrial Development Secretariat). President Sarney has just authorized the IDS to expand capacity there from 577,000 ton to 923,000 ton/year. The estimated cost, allowing for downstream units, is $460m.

Carrara also confirmed plans for Sergipe and Alagos, Sergipe will not host a cracker but is likely to have units for chlorine/caustic soda, EDC and PO, and will use natural gas reserves to produce methanol, acetic acid and derivatives and eventually fertilizers. Alagoas is tipped for chlorine/caustic soda, VCM/PVC and chlorine derivatives, with olefins later.

HYDRO GAINS UK PVC PERMISSION

Hydro Polymers, the UK subsidiary of Norway's Norsk Hydro, has gained planning permission to build a second polyvinyl chloride plant at Newton Aycliffe in the northeast of England. The project now needs approval by Norsk Hydro's board — which will also be assessing the possibility of PVC expansions at two Scandinavian sites.

A capacity of 100,000 ton/year is being considered for Newton Aycliffe, although Hydro Polymer's project manager Barry Moss says it could be "potentially something less". A decision on the £50m ($83m) investment is expected in February 1990.

The two Scandinavian projects under consideration are both expansions in the region of 20,000 ton/year or more. One is at Norsk Hydro's Porsgrunn facility in Norway and the other is at its Stenungsund site in Sweden. It seems likely that the UK proposal will receive approval and possibly one of the two Scandinavian expansions. A factor affecting the decision will be environmental opposition to chlorine-based polymers such as PVC; more of a hurdle in Scandinavia than in the UK. It is widely believed that PVC may be gradually eclipsed in certain applications such as packaging by "safer" alternatives such as polypropylene. A Norsk Hydro spokesman proposed 1993 as a plausible start-up time for those projects that get the go-ahead. The groups existing PVC capacity is 90,000 ton/year Norway, 120,000 ton/year in Sweden and 130,000 ton/year in the United Kingdom.

Environment

INDUSTRY URGED TO ADOPT CORPORATE GREEN STRATEGIES

Environment issues have now hit the top of the agenda in nearly every country, for nearly every plant and nearly every process, ICI's safety, health and environment policy group chairman, Rob Margetts, told fellow industrialists recently. Yet he admitted the company's environmental performance record was "not satisfactory." The pressures have come much faster than the ability to respond, he explained.

Sharing the platform at a recent symposium on corporate environmental policy, organized in London by the American Chamber of Commerce (UK), Nigel Haigh, director of the Institute for European Environmental Policy, noted the pressures on industry to improve environmental performance are many: from legislation, from the workforce, customers and the local population, from investors and, particularly in the US, from insurers. Industry used to resist legislation, he noted, but now those in the lead environmentally need stringent legislation so as not to be undercut fairly.

"Environmental performance is fundamental to a successful business strategy," Margetts stressed. Setting up a corporate environmental policy requires leadership from the top. "There is no substitute", Margetts said, emphasizing that the ICI approach is led by the main board. The board sets objectives and policies, and monitors progress, he told delegates. The approach involves "implicitly simple line management accountability to the top." Environmental accountability has to be as important as financial accountability.

"Every business has to have an improvement programme. For new projects and processes, the major emphasis is on avoiding waste in the first place — a policy of prevention rather than reaction. For existing operations the focus is on improving monitoring and control."

Margetts explained ICI monitors performance against four criteria: compliance with national regulations; number of complaints from the community; number of abnormal excursions categorized by severity; and progress made against defined improvement plans. For products, the emphasis is on tracking environmental impact from the cradle to the grave. This, he pointed out, has been done for some with agrochemicals.

Time was recognized as necessary for building environmental excellence into corporate culture by Robert Muirhead, safety and environmental control manger of Exxon. "In our experience, for a typical plant, introducing environmental considerations can cut emissions by 20 per cent in 1-2 years; over a 4-5 year period, 50 per cent is often readily and economically achievable.

"Build environmental systems into systems that already exist," he recommended, drawing the analogy with safety. It is essential to obtain data, but the initial effort can be daunting, he warned. It can take 3-6 months' effort to set up a database. "We found it very helpful to have an outside consultant."

Lending a US perspective, Donald Cariton of the Houston-based environmental consultancy Radian Corp pointed to regional monitoring programmes as "one of the most important tools". He noted the success of a collaborative network covering the Houston ship channel. Around 30 companies share the costs of monitoring air pollution, costs being allocated on the basis of the number of employees, he explained. "When the EPA came to Houston to impose a pollution control strategy as stringent as that in Los Angeles the Houston Chamber of Commerce recognized that such a strategy would put companies 'out of bu[siness.]' This data caused the EPA [to] re-think the whole strategy."

Over the eight years the scheme h[as] been in operation, the compnies ha[ve] curtailed their emissions, he said, "T[he] ozone level is Houston is 'straight lin[e'"]

ICI FACES $4m.CLEAN-UP BI[LL]

ICI Americas faces a possible li[ab]ility for waste inherited from the ag[ro]chemical division of Stauffer Chemi[cal] Co, acquired in 1987, under fed[eral] "cradle to grave" pollution legislati[on]. The company has already agreed to f[und] a $500,000 study into the environme[ntal] problems at the Novak Farm solv[ent] recovery site in New York State, ow[ned] and operated by the late Dale Rou[...]

New York State authorities h[ave] spent $4 m on the clean up of No[vak] Farm, and recovered 3,000 drums [of] contaminated solvents buried on the s[ite]. Records show Stauffer stored more [than] 1,000 drums at Novak Farm betw[een] 1965 and 1973. Stauffer and nine o[ther] defendents were sued under the Fed[eral] Superfund Act in 1983, and collecti[vely] face liability if the Attorney Gen[eral] shows that they, "knew or should h[ave] known," that the waste being burie[d in] the ground posed a threat to the pu[blic] health or environment. The litigation [has] been suspended pending the resul[ts of] the study due in the fourth quarte[r of] 1990.

GERMANY TIGHTENS DIOX[IN] CONTROLS

West German environment min[ister] Klaus Topfer has announced st[ricter] limits for dioxin and furan emis[sions] from waste incineration plants, whil[e the] federal health authority, the BGA [has] acknowledged for the first time [that] dioxin is probably a human carcin[ogen].

Speaking at a dioxin symposi[um in] Karlsruhe, Topfer said that new [emis]sions control reulations applyi[ng]

e incineration plants will limit ssions to a maximum of 0.1 nano- n of dioxins and furans per cubic re of air. Operators would be uired to upgrade furnaces to comply the new limits which, according to fer, are "50-100 times" more rictive than current regulations. At same time, the environment minis- alled for the new German standard e adopted throughout the EC.

lso speaking in Karlsruhe, represen- ves of the federal health authority, federal environmental authority and state environment ministers of en-Wurttemberg and Hesse, called chemical producers to review their duct portfolios carefully to determine ch chlorinated chemicals are a rce of dioxin. The authorities sug- ed that certain products, including C and some pesticides, could be ricted or banned. The health author- s Arbad Somogyl said there are now rious indications" that dioxins and ns can cause cancer in humans. He he based his interpretation of the rds on a dioxin study conducted by SF following a 1953 incident at wigshafen. Soil tests are said to cate that the entire surface and pop- ion of West Germany are threatened lioxin. The environmental authority points waste incineration plants as principal source.

USTRY ATTACKS REEN" BILL

he UK's chemical industry has cked the government's recently pub- d environment protection bill for k of clarity." The bill had its nd reading in the UK parliament ntly. In a brief to MPs before the ate, the Chemical Industries Asso- ion (CIA) said it was "extremely cerned at the lack of clarity about the various key measures in the bill be implemented". Ray Grainger, CIA's product and regulatory affairs ctor, says Part I of the bill, which s with integrated pollution control, proposes to give the Secretary of State very wide ranging powers but "gives very little detail of how those powers are likely to be exercised. The industry is further concerned that the bill contains vague terminology. Clive Thompson, of BP Chemicals and chairman of the CIA's green bill task force, criticizes it for being "almost totally devoid of the concept of measurement". "The concept of there being a standard to adhere to is not reinforced enough in the bill," he says. He also notes that the process of attaining authorization appears to be potentially prolonged, making it unworkable for speciality chemicals manufacturers.

A further concern voiced is a perceived lack of commitment of people and resources, not just in HM Inspectorate of Pollution but in local authorities. "If the UK is to have the bill, it has to be credible from all sides — the public, the pressure groups and industry. It has to be capable of being understood and enforced," says Thompson. Thompson stresses that the CIA welcomes the bill in principle, but is now calling for clear standards a system of authorization which does not lead to undue delays and knowledgeable inspectors.

HOECHST APPLIES FOR BURNDER EXTENSION

As expected, Hoechst has applied to the district government in Darmstadt for permission to continue to operate its 40,000 ton/year toxic waste incineration plant at Frankfurt beyond the December 1990 expiry date of its current permit. The company is still awaiting approval of plans to build a new 60,000 ton/year incinerator at its main works. Some 2,500 objections to the facility were aired at a public hearing in October. Opponents of the plant have indicated they will file further objections if state authorities approve the controversial facility.

Technological Scene Abroad

NASA COURTS FIRMS FOR COMPOSITE RESEARCH

The US National Aeronautics and Space Administration (NASA) is to spend $ 142m on the R & D of composite materials over the next six years to ensure US airliner manufacturers remain competitive with their European rivals.

While the major recipients of this money are aircraft manufacturers like Boeing ($ 22.6m), Lockheed ($22.5m) and McDonnell-Douglas ($23.7m), composite materials manufacturers like Dow Chemical and Hercules Aerospace will also receive sponsorship.Hercules' marketing manager for materials, Dr. Albert Vicario, says negotiations between NASA and Hercules are not yet complete. The space agency is expected to award a contract worth about $1.5m to Hercules to demonstrate the use of fibre replacement materials such as IM7 graphite and 85 51-7A epoxy resin in aircraft primary structures. According to Vicario, Hercules will manufacture sub-scale parts and test panels over the next two years to assess their performance as potential aircraft components.

Dow has been awarded a similar contract by NASA. In addition, Dow has a joint venture with United Technologies in Stamford, Connecticut, called Dow United Technologies. This will develop products such as epoxies, urethanes and a high strength polybenzoxazole fibre material, according to Robert Pangborn, Dow's business development director and advanced materials. Pangborn hopes this fibre will be able to replace graphite fibres in composite materials. Also under development is a semicrystalline high-temperature aromatic polyamide resin which, Pangborn hopes, will find applications in aircraft and spacecraft. NASA hopes to gain enough technology from its investment programme to build a substantially complete airliner by the mid-1990s. At present, composites are usually only used in secondary structures; according to NASA this is because of high raw material costs, labour-intensive manufacturing and inadequate structural and materials technology. NASA hopes the programme will give a scientific understanding of failure mechanisms and establish the performance limits of advanced composites in structural applications.

The current leader in advanced composites usage in aircraft primary structures is Europe's Airbus Industrie, which has used Ciba-Geigy's carbon fibre reinforced plastic to construct Air-bus tailfins since 1985.

LUMMUS/MONSANTO AND UOP MERGE EB/STYRENE PROCESS

Lummus Crest, Monsanto and UOP have agreed to merge their technologies for the manufacture of ethylbenzene and styrene. The companies believe the integration will result in one of the most efficient and cost-effective technology packages offered worldwide. The technologies are applicable to revamps, expansions and new plants.

Lummus Crest, with its co-licensors, Unocal and Chemical Research and Licensing, will contribute its ethylbenzene process technology based on a proprietary zeolite catalyst and catalytic distillation technology. UOP will supply the proprietary catalyst and be responsible for catalyst development. The main focus of the venture is to integrate UOP's Styro-Plus oxidative reheat and associated technologies with the Monsanto/Lummus Crest styrene technology."UOP's oxidative reheat technology allows for increased single-pass ethylbenzene conversion, reducing operating and investment cost," says Lummus Crest president Stephen Solomon. Warren Sedlacek, senior vice-president of UOP, explained that, although UOP has much experience in the styrene business, it has done in recent times, except develop Styro-Plus process. Meanwhile, I mus/Monsanto have been very a with their leading dehydrogen technology. By combining the technologies "we think we ha winner", Sedlacek said.

The three companies are curr working on the design of a unit to i porate the combined technologies, lacek said. The companies are loo at a list of some 30 possible pro including both revamps and new pl Monsanto also brings its ethylben technology based on a homogen aluminium chloride catalyst an ethylbenzene dehydrogenation tec ogy to the collaboration. Lummus and UPO will jointly market the nology package world-wide. Both panies will also share responsibili engineering and technical service

MONTEDISON MAKES ECO-PLASTIC

Montedison Researchers unveiled a range of advanced "ec ical" plastics which will soon be for industrial production and com cialization. The first is a multi-pur plastic capable of exhibiting va characteristics and performances, as rigidity or flexibility, accordi end-use. As an example, the com says it will soon be possible to re the broad array of plastic material rently used in automobile dashb with a single plastic, appropriatel cessed. "There will be tremendous logical advantages," said a com spokesman, "since the wide vari plastics on the market has been o the biggest constraints on recycla of structural plastics.

A second material, intended for cultural use, consists of a plastic f shield crops from severe cold. " plastic films are completely differ that they have the ability to absorb radiation," said the spokes

Biotechnology

HE FORMS MALARIA CINE DUO

che Products, the Australian affil- of Switzerland's Hoffmann La e, is stepping up efforts towards a ria vaccine by teaming up with bourne-based Saramane, an organ- on founded four years ago specif- y for malaria vaccine development.

alaria is a serious public health em, but to date a vaccine has ed elusive because the life cycle of nalaria parasite comprises several s. In recent years research has con- ated on producing the specific pro- present on the surface of the rent stages of the malaria parasite on developing potential malaria nes from these antigens.

vious work by Roche and Sara- is complementary. The Australian ists have identified various anti- of the merozite stage (the blood tage of the parasite) and tested in animals as potential vaccines, Roche has synthesized certain n structures from the surface pro- f the sporozoite stage (the stage malaria parasite which is injected e bloodstream with the mosquito and shown that this vaccine ed partial immune protection in n volunteers.

he says efforts are currently way to improve this vaccine can- At the same time the company ying out animal testing with a ally engineered merozoite sur- rotein.

collaborative venture is expected to the development of a malaria e consisting of several antigen nents for increased effectiveness. oche concedes that, in spite of s in identifying parasite antigens, re still numerous problems to nd several years of R & D will be necessary before a vaccine can be launched on the market.

GAMMA INTERFERON

Genentech is seeking US approval to market recombinant gamma interferon to treat patients with chronic granulomatous disease (GCD). The US biotechnology major has filed a product licence application with the US Food and Drug Administration.

GCD is a rare inherited disorder in which the body's white blood cells are unable to kill invading bacteria or fungal agents. To date the existing therapy involves frequent antibiotic doses. Genentech envisages gamma interferon can be used along with antimicrobial therapy to treat active infections as well as for the prevention of infections.

Genentech is also looking at the drug's ability to stimulate the immune system as a potential treatment in other indications. Phase III trials continue to evaluate its safety and efficacy when treating patients with infections relating to traumatic injuries, and as an adjuvant therapy to treat patients with melanoma and small cell cancer of the lung.

COURT RULES STALEMATE ON EPO PATENTS

A federal magistrate in Boston, Massachusetts, has ruled on the patent infringement dispute between US biotechnlogy companies Genetics Institute (GI) and Amgen, over the production of erythropoietin (EPO). The court ruled that neither company has the overall right to produce EPO by genetic engineering, and considered both companies' patents partially valid and mutually infringing. The decision offers no clear victor and could set the stage for a possible cross-licensing agreement.

The ruling is important because EPO, with current expected sales of $ 100m/year, is likely to be one of the biotechnology industry's most valuable products.

EPO is a kidney cell protein that stimulates bone marrow red blood cell production. In the US, it is produced exclusively by Amgen as Epogen, and approved for treating anaemia in kidney dialysis patients. GI's version, Marogen, is currently awaiting FDA approval.

The most likely outcome of the ruling, is that GI will be able to produce Marogen abroad. The company has been prevented from producing EPC in the US by the Amgen patent, but has granted a licence to Japan's Chugai Pharmaceuticals. Marogen is imported into the US for experimental use. The new ruling, that offshore production of EPO does not infringe the Amgen patent, effectively ends the litigation designed to prevent parallel import.

DRUG MARKERS

A Shell Group biotechnology subsidiary, Biocode, based in York, UK, has developed an analytical method which it claims can be used to combat the problem of counterfeit pharmaceuticals. The company has developed a range of protein markers, which can be introduced to genuine products and an immunoassay technique, which can easily identify these markers at levels which would otherwise require expensive instrumentation.

Biocode managing director, Tim Wilkinson explains that the technique can be applied to any high value product, which could even include foods, by presenting the marker in the form of an accepted additive. The trace levels of the markers are identified by monoclonal antibodies, which are specific to a particular antigen — in this case the marker, at levels as low as 10 ppb. The marker can be infinitely varied, adds Wilkinson, and could be changed regularly, to date a particular batch of chemical product.

CHEMICAL WEEKLY
SUPPLEMENT ON
LEATHER PROCESSING

LEATHER ABSTRACTS

Comparison of one-bath and two-bath unhairing systems. A. Boast and R.D. Fichsmann. *J. Am. Leath. Chem. Assoc.*, , 289, 1989.

A matched side comparison has been carried out between ne-bath and a two-bath unhairing systems using eight sides treatment. After unhairing separately the hides were ome tanned, retanned and fat-liquored together.

The results showed that the two unhairing systems gave y similar and acceptable results. However, the leather pro- ced from the two-bath unhairing system showed definite antages as far as grain cleanliness, lime draw and growth rks are concerned. Slightly firmer leather was obtained n the two bath system, with a correspondingly lighter grain ak. It is felt that the softness aspect can easily be corrected slight adjustments to post-tanning operations.

mproved uptake of basic chromium salts in tanning ope- ons using keratin hydrolysate. G. Ramamurthy, P.K. gal and Mahendrakumar. *J. Soc. Leath. Tech. Chem.*, **73**, , 1989.

ineral tanning practices have become increasingly more mon in recent years and there is increasing concern that nium discharged in the effluent after chrome tanning cause ecological problems. Keratin hydrolysate (KH) pared from poultry feather and tannery hair is found to ce the discharge of chrome in effluent to an appreciable nt. KH was employed both in chrome tanning and roming operations. In chrome tanning KH was added in anning bath after basification and in rechroming, KH was d in the same float either before or after rechroming. trol sets without KH were run simultaneously under iden- conditions. All the experiments were conducted on goat s. Total chrome in the exhaust liquor and in the leather both before and after addition of KH was estimated for each set. Data on physical parameters of leather were also measured.

It is also seen that the use of KH helps to reduce the percentage of syntans and fillers required for retanning. Using the data obtained from laboratory tests the process was scaled up in our tannery permitting us to assess the commercial aspects of the use of KH in leather processing.

An investigation into differences in properties of leather produced from chrome recycling and conventional chrome tannage. D.A. Boast. *J. Soc. Leath. Tech. Chem.*, **73**, 164, 1989.

A set of chrome recycling trials have been carried out to determine the extent of the influence that chrome recycling has on the colour and properties of the resultant leathers. Initially chrome recycle liquor was obtained from a commercial tannery that had been continuously chrome recycled for a period of 18 months. A total of eight cycles was then carried out at LIRI using four sides per cycle with the matching sides being processed by a conventional chrome tanning. The chrome contents of the matching wet blue sides being processed by a conventional chrome tannage. The chrome contents of the matching wet blue sides were very similar and the influence that chrome recycling had on the final leather colour, dyes medium brown, was from no difference (66% of sides) to slightly lighter (34%).

Versatility of crust leather and its growing importance. David Tack. *World Leather*, Dec./Jan. 12, 1990.

Crust leather is a versatile base material available undyed or dyed in a wide variety of substances and fat liquored for different purposes. In this paper the author reviews the basic

steps in its manufacture and points to the contribution of new developments.

Practical quality control in the tannery. Norman Cutting. *World Leather*, Dec./Jan. 20, 1980.

With the variability of new material, a few isolated anal yses or physical test results are of little value. The autho recommends that determinations should be performed in a regular basis and the results recorded by the overall qualit controller.

NEW PRODUCTS

EUTRALISING AGENT WITH MASKING PROP-RTIES

Newtugan F from BASF is a neutralising agent, with mask-g properties for fixing chrome tanning agent in the neu-lisation stage. The chrome tanning agent is fixed so ongly to the leather fibre that only small amounts of chrome removed in the subsequent retannage, dyeing and fast uoring process.

IQUE AQUEOUS PATENT FINISH FROM EARN-IAW

Aquathans is a 35 per cent solids anionic aliphatic poly-thane dispersion which will form a tough abrasion resist- film with excellent light fastness and gloss. Tensile ength 40 MPa, elongation 400 per cent. This unique system ers the finisher an environment friendly system with no rage problems; The product having unlimited pot life. It ast to light, adheres well to leather and has good flexi-ty (100,000 Bally flexes). *World Leather*, Oct./Nov. 39.

BRICATING ACRYLIC SYNTANS

Rohm & Haas has introduced a new class of polymeric ylic syntans offering major advantages in leather produc- such as excellent lubrication, improved colouring, ngth and finishing. When used as retanning agents as ome tanned blue stock, these syntans are found to impart softness and strength and a marked degree of water repellency to the leather. The leathers are not only water resistant but also much easier to handle and more comfortable to wear.

LIQUID BATES FROM ROHM

The Orphon F range of liquid bates land themselves to automated processing systems because of accuracy and ease of dosing. The products are low in ammonia and free of sulphates. They are purified in order to avoid fermentation during storage, especially in tropics and contain preservatives.

NEW BACTERICIDE

ICI has introduced Proxel LB a new bactericide for use in soaking hides and skins. It is anionic, has a pH of 9.5 and is effective over a wide pH range, readily degrading by absorption when discharged in effluent. 0.1 to 0.5 per cent on the weight of green hides gives satisfactory results. Proxel LB is a concentrated aqueous solution of sodium 1,2-benzisothianzolin-1-one and dipropylene glycol.

SYNTHOL DP 460 FOR LIGHT FASTNESS

A pure synthetic fatliquor, Synthol DP 460 from Smit and Zoon is for garment and upholstery leathers where lightness is crucial. It is claimed to have good penetration and distribution, resulting in soft, medium full leathers with a slightly satin feel. It can be blended with other fatliquors. *World Leather*, Dec./Jan. 1990.

INDIAN LEATHER SCENE

BRIGHT FUTURE FOR LEATHER INDUSTRY

The importance of close interaction between industries and research institution was stressed by the Governor, Dr. P.C. Alexander. In India the industries went in for consultancy services offered by research institutions and universities only when they became sick. Industries should not flinch in spending some money on consultancy, the Governor said, inaugurating the three-day 25th Tanners Get-Together at the Central Leather Research Institute (CLRI), Madras. He advised the leather industries to avail themselves of the services offered by the CLRI at low rates in a greater measure.

With exports expected to exceed Rs. 2,000 crores compared to Rs. 175 crores some 15 years ago, the leather industry had a bright future and would play an important role in increasing the share of manufacturers in the country's exports, Dr. Alexander said. The prospects for capital goods industries were not bright as they would have to face foreign competition, require import of components and raw materials and would have to offer soft credit and aid. The leather industry did not have to contend with these disadvantages in the field of exports.

Presiding over the function held at the new auditorium with a capacity for 400 built at a cost of Rs. 60 lakhs, Dr. A.P. Mitra, Director General of Council for Scientific and Industrial Research, said the CSIR proposed to build such conference centres in Delhi, Calcutta, Hyderabad, Mysore, Goa and Lucknow. In the recently framed action plan for science and technology for poverty alleviation, accent had been placed on boosting tanning industries and development of cost-effective locally available inputs. The CLRI's success in new processing techniques to reduce pollution effects needed to be publicised, he said. For village-level operation, research institutions like the CLRI should train the trainees.

Anti-cholesterol drug

On the activities of CSIR and other research institutions coming under it, Dr. Mitra said a new anti-cholesterol drug, 'Gugulipid', developed by the Central Drug Research Institute had been licensed to France and negotiations were under way for licensing a National Chemical Laboratory catalyst to a firm in Holland. Last year two reverse osmosis desalination plants were gifted to Thailand. Of the agrochemicals developed by CSIR, 15 were in production with an annual turnover of Rs. 100 crores. In frontier areas, new materials for temperature superconductivity had been prepared and the first device was expected to be completed by March, sa Dr. Mitra.

The first all-science satellite, SROSS, expected to launched from SHAR by the end of this year containe major payload from the NPL. Mr. M.M. Hashim, Chairm Council for Leather Exports and President, All India Sk and Hides Merchants Association, said sludge disposal w posing a problem in effluent treatment plants and urged CLRI to come out with a solution. Mr. A. Sahasranama Executive Secretary, Council for Leather Exports, saw increasing role of the CLRI in developing processes for f ishing imported leather and in assisting industry to m export challenges.

Mr. Sanjoy Sen, Chairman of the CLRI's research co cil, said the institute was going commercial and undertak sponsored research. It was fully geared to taking technol forward. With UNIDO loans, its extension centres would equipped to provide all the services needed by the lea industry.

Welcoming the gathering, Dr. A.B. Mitra, Director CLRI, said that it would be launching a joint project on e ronment technology with the Dutch Government organ tion, TNO. There was also a possibility of a UNIDO pro in leather effluent treatment materialising for CLRI to w with the Tamil Nadu Pollution Control Board to ere state-of-the-art plant in a commercial tannery. Ano UNIDO project on footwear design and development m also fructify next year.

Dr. K.S. Jayaraman, Deputy Director, said over 400 egates were attending the get-together sponsored jointl the CLRI, Council for Leather Exports, All India Skin Hide Tanners and Merchants Association, Indian Lea Technologists Association and Committee on Science Technology in developing countries. Dr. T. Ramasw Senior Assistant Director, proposed a vote of thanks.

Call to spend more on R & D

Later delivering the Nayudamma Science Foundation ture on "Science, technology and national developme Dr. A.P. Mitra, called for increased investment by ind and Government on research and development. He w the view that money required for research and develop estimated to be Rs. 10,000 crores by 1994-95, could be p raised by levy on sales turnover of industries, cess and charge on capital goods import.

6 CRORE WB LOAN FOR LEATHER INDUSTRY CARDS

The leather industry in India is in line for a World Bank n of Rs. 6 crores. The entire amount will be spent on ther research in India. Roughly two crores of it will be ent on developing new leather processing techniques. The emical processing research will benefit from a similar share. e rest will be absorbed by the footwear sector.

Disclosing this to newsmen at Madras recently, Dr. R.B. tra, Director, Central Leather Research Institute (CLRI) d that services and technologies offered by CLRI are find- increased use in the country's leather industry. There has n a 50 per cent increase in the external cash flow of CLRI he previous year. This comes to around 17 to 20 per cent the total budget of 4.8 crores. It is expected to go up to per cent this year, he said.

Mr. Mitra was briefing the newsmen prior to the TGT. The eting will have its focus on 'The Perspective Policies and ns for Leather Industry in Nineties'. Explaining the sig- cance of the theme and its implication on the future growth he industry, he said there is a need for evolving a national sensus on the issue. An attempt had already been made year to bring about co-ordination among the professional ies working for the progress of the leather industry, Mr. ra pointed out.

his year, TGT will review the technological develop- nts in the leather sector during the last year. On the new ymes, Mr. Mitra said that the leather industry is planning ommercialise it. These enzymes will be used to remove nal hair, doing away with the conventional method. In opinion, the low cost of production and high selectivity he enzymes will make it economically and technically e viable. Sulphide pollution can also be checked with the method.

mong the new leather making methods developed, the adation of lower ends and rural tanned leathers has been or breakthrough. The former process helps cut down r use up to 40 per cent. This, in turn, will bring down mount of effluents and provide a saving of 15 per cent me chemicals. Mr. Mitra said that upgradation of rural ed leathers is necessary keeping in view of the fact that ges are the main suppliers of many of the carcasses. A ey of CLRI says that carcass worth Rs. 600 crores is ed annually.

eferring to other activities of CLRI, he said last year the ute helped in commissioning India's first microproces- ontrolled tannery at Ranipet. It has now taken up development of indigenous microprocessor based control systems as part of its efforts in speeding up modernisation of small scale tanneries. A pilot facility for the purpose is being installed. Besides, a chrome recovery plant was also set up in a commercial tannery in Kanpur as a part of CLRI's efforts in the Ganga action plan. The plant serves as a model for recovery and reuse of chromium from effluents. This will bring down the chromium content in the effluents.

Commenting on the draft for leather sector in the Eighth Plan, Mr. K.S. Jayaraman, Deputy Director, CLRI, said that the main accent will be on raw material availability and export. The project export earnings for this year is Rs. 2,000 to Rs. 2,200 crores. At present 60 per cent of the leather produced in the country is exported. A lion's share of this is in the form of finished products. Leather industry will insist on more incentives from the Government for the export of value added products during the Eighth Plan, he said. Referring to the low impact of CLRI on the footwear scene, Mr. Mitra cautioned that the situation can be changed only by encouraging indigenous production and designs.

LEATHER FAIR LURES MANY

The five-day long Fifth India International Leather Fair, organised by the Trade Fair Authority of India (TFAI), came to a close at Madras on February 4. Described as an 'unprecedented success', the fair witnessed a record participation of nearly 260 exhibitors, both from within the country and from abroad. A quick survey revealed that it provided significant new business contacts in regard to export and import possibilities and domestic trade.

According to Mr. K.V. Rajan, Chief General Manager, TFAI, indications are that the business generated would be 'much larger that the previous years'. TFAI enquiries among last year's participants had shown that business worth around Rs. 100 crores was done as a spin-off of the fair over the next 12 months. 'It could well be double that figure for this year', he feels. Mr. Rajan told newsmen that roughly 50% of the transactions was for exports. This should set at rest the criticism aired at certain quarters that the fair is largely import-oriented. Also, a computerised scan, arranged with assistance from NIIT, showed that of the 1500 business visitors registered on the first three days, the percentage of exporters was 37.37, while that of the importers was a mere 10.93.

Even so, the fair was not without its share of a good number of import deals being worked out for subsequent follow-up. The items included sophisticated machinery and equipment, raw hides and skins and finished leather. Hides and skins in wet blue alone attracted import enquiries to the tune of Rs. 60 crores. Mr. M.M. Hashim, Chairman, Council for Leather

Exports (CLE) said the business visitors came from as many as 25 countries. This apart, there were official delegations from eight countries which included West Germany, Italy, France, the Netherlands and Cyprus. A number of individual buyers from countries like the US, the UK and Pakistan also visited the fair.

He said one of the three objectives of the fair, an annual event, is to bring to the country the latest technology to help modernise the production facilities here. Another aim is to find out sources to replenish the depleting domestic raw material base. On all these counts, the fair was a great success, he said.

Leather units urged to boost export

The leather industry has been called upon to attain a 'minimum critical level' of domestic production and marketing efficiency as a prerequisite for stepping up exports. In a competitive international environment, exports depend directly on this efficiency and not on any general comparative advantage, Mr. Arun Nehru, Union Commerce Minister, said in his address, read out in absentia, at the inaugural function of the leather fair.

That the country has remained well short of attaining this critical efficiency is evinced by the fact that despite impressive export achievements in recent years, its share in the world market has been rather negligible, he noted. Mr. Nehru also felt that there should be effective inter-linkages of the various operations to derive maximum conversion efficiency at every stage. This is more so in the leather industry where the activities are widely dispersed and diffused.

The organised sector should support the initiatives of the Government to help establish the linkages with the primary producers which, in turn, will lead to gaining higher value advantages in the product, he said. The minister exhorted the leather manufacturers and exporters to take full advant of the various export promotion programmes to establis name for their products in the international market. For o image-building and brand promotion form important aspe of an efficient marketing strategy.

Unfortunately, this area has been one of the weak sp of the industry. Consequently, the country's share in the wo market has stagnated around three per cent. It is, therefo high time that an Indian brand name took its designated pl in the world trade, he observed. Referring to the proble faced by the industry, Mr. Nehru revealed that the Gove ment is looking for ways to systematically solve some of issues like limitations of cargo clearance capacity, cong tion in airports and cumbersome export documentat Mr. S.P. Shukla, Commerce Secretary, who inaugurated fair in the Minister's absence, disclosed that he had ea met representatives of the leather export community and cussed various issues. Some concrete proposals and id emerged from the meeting which will be followed up o priority basis in the weeks ahead, he said. He also expres the hope that a suitable and permanent exhibition site co be developed in Madras.

HELPING INDIA TO BOOST EXPORTS: IBRD LAUNCHING EMF-II

The World Bank is launching its second round of m keting development fund from March this year to help I improve its exports to the developed world. The Export M keting Fund (EMF), as it is technically termed by the W Bank, was exclusively for the promotion of engineering g and India's share of allotment was Rs. 12 crores. The E II will be an enlarged one and, according to Mr. And Singer, consultant to the World Bank, who was in Ma the facility will now be available to the leather indu also.

he exact quantum of assistance available under the EMF-s not readily available. But it is understood that EMF-II l cover all manufactured goods. Under the proposed eme, according to Mr. A. Sahasranamam, executive direc- of the Council for Leather Exports, whom the World Bank cial met, any exporter can prepare a market-development n with finite schedule, with specific inputs — like improv- production technology, organising foreign trips to market product, appointing market consultant and the like — and ward it to the canalising agencies like the Exim Bank, nara Bank, Bank of Baroda and ICICI. Fifty per cent of projected cost will be reimbursed under the World Bank eme.

Ar. Singer who also met several leather exporters in dras urged upon them to make best use of the EMF-II. anwhile, a large contingent of leather entrepreneurs from st Germany is now in Madras virtually on a buying spree sponsored by the FRG government under a programme ed Indo-German export promotion project. It aims at roving two-way trade relations with a focus on leather ds among others.

he project team includes prominent leather marketing npanies in Germany, who are anxious to have long-term ps with Indian exporters. They have come up with spe- demands and are prepared to place spot orders or pay he products for the German market. The team had already round some of the factories fitted with modern manu- uring facilities. At a face-to-face programme the Ger- s told the Indian exporters that their market was very wide a growing one. Indians could get a due share of it if they d meet the demands of the discerning consumer. Qual- imely delivery, consistency were important, they stressed.

oth Mr. Sahasranamam and Mr. M.M. Hashim, Chair- , CLE, underscored the need for the Indian exporters to all-out efforts to capture the vast German market, which e recent past had accepted many of the Indian goods. shoe uppers, leather garments and other fancy articles, nan market had tremendous potential. In fact in all these there has been a perceptible increase in Indian exports st country, though the share of India was small. Mr. im said the CLE's focus during 1990s will be image ing abroad. It was time "Indian brand" products were eted abroad, he said.

WOOING US INVESTORS

e US leather industry, facing a declining trend on the stic production front, could consider investing in India n has the necessary expertise and resources, according . M.M. Hashim, Chairman, Council for Leather Exports). A host of factors like shortage of manpower, rising wages and stringent anti-pollution regulations had made the going tough for the US industry leading to a substantial fall in production. Consequently, it has started shifting operations to other countries like Thailand and Indonesia.

But India, with its abundant availability of skilled labour and a rich raw material base, had yet to figure in the investment priorities of the US businessmen. This is surprising because other countries like South Korea and Taiwan have been keen on investing here, Mr. Hashim while participating in a seminar on "Indo-US co-operation in development of leather industry in India" at Madras on February 4. He pointed out that India had now a conducive climate for foreign investment and this had come about because of a policy of liberalisation the country had been following during the past couple of years.

Referring to the prospects of increased exports of Indian leather items to the US, Mr. Hashim noted that the time was most opportune for Indian exporters to make a dent in that market. For one, major exporters to the US like South Korea and Taiwan were themselves facing a situation similar to that in the US with a deceleration in production activities. By adoption a proper marketing strategy, India could capitalise on it, he felt. The CLE chairman, however, regretted that despite India being a major leather producing country, the US had not come out with any assistance programme for promotion of exports on the lines of West Germany.

The Council had now identified US as a thrust area as part of its marketing strategy for the nineties and had drawn up a programme to increase India's share in that country's imports from the present less than one per cent to five per cent over the next few years. To begin with, the Council is trying to have collaboration agreements with two leading departmental stores there, Mr. Hashim informed.

Mr. A. Sahasranaman, Executive Director, CLE, said in his keynote address that though the US industry had shown signs of consolidation in the last couple of years after a prolonged bout of declining growth, it was only a temporary phase. With the demand projected to increase substantially in the coming years, the US would come to depend more and more on imports, he said. But, given the peculiar nature of that market, India would have to evolve an effective strategy to garner a good chunk of it, he observed.

A distinctive feature was the vastness of the country with varying tastes from region to region and different dealers catering to specific price and market segments. Another important aspect was its high sensitivity to price. As it was an open market, suppliers from all over the world converge there triggering intense competition. There was still scope for developing countries like India to compete and survive in the US

market. Mr. Sahasranaman pointed out. In support of this view, he cited that as much as 75 per cent of the total leather imports by the US last year was from developing countries.

Mr. Rajendra K. Dheer, Commercial Consul, US Consulate General, Madras, who presided, called upon the leather manufacturers to avail themselves of the grant extended by the trade and development programme of the US for taking up pre-feasibility and feasibility studies on the proposed common effluent treatment plants. They could also share the experience of the US consultants and capital goods suppliers. USFCS, an agnecy of the Department of Commerce, could also assist them in joint ventures with US product manufacturers for creating manufacturing facilities. Besides, the agency would help source US suppliers of machinery and provide assistance.

CLE BLUEPRINT TO BOOST EXPORT

A detailed plan for human resource development for leather industry to achieve the quantum jump in exports from Rs. 2,000 crores to Rs. 10,000 crores within this decade is being drawn up by the Council for Leather Exports (CLE). A CLE's spokesman said that the existing training facilities are meant to produce craftsmen and serve some useful purpose in providing a fillip for small-scale units but do not have relevance to the large-scale export production facilities of international standards.

In chalking out the plan the Council for Leather Exports will lay emphasis on footwear and leather goods sectors, which possessed tremendous export potentials, for establishing new institutes with modern equipment for imparting training in various disciplines and for upgradation of existing training facilities. According to Mr. Mohammed Hashim, Chairman, CLE, there is an acute shortage of trained manpower with only 130 professionally qualified persons being provided annually as against the requirement of 10,000 persons per year.

The sub-working group on leather for the Eighth Plan in its report has suggested for augmenting manpower for the industry besides strengthening the existing CFTCs by associating representatives for the industry in their management. The sub-working group has further suggested for setting up of more CFTCs at selected places in the country and for introduction of training of workers as a subject in the industrial training institutes. This apart, association of manufacturers and other bodies should be encouraged to set up such training facilities for workers.

Meanwhile, a study of the official data shows that earnings from export of leather and leather products have recorded a spectacular growth from Rs. 436 crores in 1983-84 to Rs. 1,608 crores in 1988-89. However, the complexion the composition of exports for corresponding period has undergone much change.

The study further shows that a substantial percentage India's export earnings is being contributed by leather shoe-uppers, which are not consumer products. Accord to the 1988-89 figures of the total exports, finished leat constituted 42 per cent, semi-manufactured products such shoe-uppers 30 per cent and the balance of largely low va footwear, leather goods and garments in comparison to statistics for 1983-84 which show that finished leather co prised 45 per cent of exports, semi-processed leather 12 cent and semi-manufactured products such as shoe upp 26 per cent.

CALL TO BAN FINISHED LEATHER EXPORTS

The Indian Leather Products Association (ILPA) beli that in order to attain the ambitious Eighth Plan export ta of Rs. 3,600-crores, phased banning of exports of finis semi-finished and crushed leather is a must to ensure quate availability of raw materials for value added prod This was observed by Mr. K.K. Dhandania, Chairman (ern region) of ILPA while talking to the newsmen on opening day of Leathervision '90 at Calcutta on Februa

To achieve Government expectations of doubling value-added items exports, uninterrupted supply of raw m ials was essential. The value-added items would accoun 90 per cent of the total projected exports of Rs. 3,600 c against the current year's 60 per cent of total estimated ex of Rs. 2,000 crores.

ILPA suggests a total ban on exports of semi-finished crushed leather by the end of 1990-91 and phased dis tinuance of finished leather exports. Alternatively, the in try would face an acute shortage of leather which w adversely affect exports in the next Plan period. Beside Dhandania, others present at the press conference incl Mr. S.K. Gupta, Executive Director, Mr. V.K. Dhand Vice President and Mr. S.S. Sawhany past President of and Mr. M.V. Kulkarni, past convenor of Leathervis

Against the backdrop of the ambitious export targ Rs. 5,000 crores by the turn of the century, Mr. Dhan said, the need of the hour was to envisage and impl long-term policies for an all round development of the l industry. A macro policy for the leather sector must exhaustive and extensive modernisation of the industry ifested through complete restructuring and upgradati production infrastructure with the twin objectives of en ing productivity and obtaining the highest possible unit realisation in foreign exchange.

MARKET INFORMATION

Titanium Dioxide Up

isk demand saw prices of titan- dioxide anatase variety go up by 5/kg in the Bombay chemicals ket during the week under re- . Material was being traded at 80/kg when reports came in. stic soda flakes also firmed up by about Rs. 1.50 with price being quoted at around Rs. 11.50/kg. Bromine liquid eased slightly to Rs. 65 per kg and toluene to Rs. 11/litre. In the dyes intermediates section 5-sulpho anthranilic acid was up by Rs. 5 to Rs. 80/kg. Trading was moderate.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on February 20, 1990)

STRIAL CHEMICALS	Per Kg.
onium sulphate	2.50
onium phosphate (Mono)	14.50
onium phosphate (Di)	14.50
onium carbonate (Di)	17.00
onium bicarbonate	6.00
onium chloride	3.25
onium nitrate	6.00
ic white powder	25.00
mide (Resale)	71.00
n carbonate	13.00
hing powder (33% Cl)	5.00
Borax (Granular)	17.50
Borax (Powder)	22.00
Boric acid (Tech)	26.00
Bisphenol-A	75.00
Butyl carbitol	110.00
Caustic soda (Flakes)	11.50
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	6.00
Calcium carbonate (Activated)	5.75
Cobalt oxide	300.00
Cresylic acid	62.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	44.00
Copper sulphate	26.00
Chromic acid	63.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	116.00
Hydro	35+ST

Hyflosupercell	22.00
Hexamine (Resale)	34.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	39.00
Lithopone	19.00
Magnesium chloride (Crystal)	2.00
Menthol crystal (Flakes)	355+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	30.00
Magnesium carbonate (Indian)	26.00
Maleic Anhydride (Resale)	42.00
Mercury (34.5 Kgs)	11,500.00
Nickel chloride	110.00
Oxalic acid (Resale)	17.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	26.00
Potassium carbonate (Imported)	36.00
Potassium bichromate	33.00
Potassium phosphate (Mono)	34.00
Potassium phosphate (Di)	25.00
Polyvinyl alcohol (No. 117)	115.00
Polyvinyl alcohol (No. 173)	117.00
Polyvinyl alcohol (No. 208)	120.00
Paraformaldehyde (Resale)	25.00
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	49.00
Paraffin wax	19+ST
Rangolite (German)	96+ST
Rangolite (Czech.)	70.00
Sodium sulphate (Fine)	3.75
Sodium sulphate (Coarse)	3.90
Sodium sulphide 50-52% (Flakes)	11.50+ST
Sodium sulphide 58-60% (Flakes) (TCL)	25.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	730.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	4.90
Soda Ash (Birla)	4.30
Soda Ash (Imp.)	4.50
Sodium bicarbonate	6.00
Sodium bisulphite	8.00
Sodium silicate	5.50
Sodium acetate	7.20
Sodium alginate	420.00
Titanium Dioxide (Anatase)	80.00
Titanium Dioxide (Rutile – RCR_2)	118+ST
Tartaric acid	109.00
Trisodium phosphate	12.00
Thiourea	84.00
Urea (Tech.)	3.00
Vacuum salt	1.00
Zinc Dust	52.00
Zinc Oxide	57.00
Zinc chloride powder (Tech.)	20.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.00
Acetic Anhydride (Resale)	36.00
Acetone (Resale)	17.00
Adipic Acid	70.00
Aceto Acetanilide	55.00
Aniline Oil	50.00
Benzoate Plasticiser	62.00
Butyl acrylate	84+ST
Butyl stearate	38.00
Butanol	34
Benzyl Alcohol	60
Benzyl Chloride	34
Benzo trichloride	16
Benzoyl chloride	22
Bromine Liquid	65
Chloroform	27
Carbon Tetrachloride	19
Cellosolve	60
Cyclohexanone	57
Cyclohexanol	58-
Diacetone (Resale)	27
Diethyl Oxalate	34
Diethyl glycol (DEG)	25
Dioctyl Phthalate	44
Diallyl Phthalate	41
Dimethyl Phthalate	28
Dioctyl Adipate	5[illegible]
Dibutyl Adipate	4[illegible]
Dipentene	1[illegible]
Dimethylamine 40%	5[illegible]
Dimethylamine 50%	5[illegible]
Ethyl Acetate	2[illegible]
Ethyl Acrylate	7[illegible]
Ethylene Dichloride	1[illegible]
Ethylene Glycol	3[illegible]
Formic Acid (Imp.)	2[illegible]
Formaldehyde (Resale)	[illegible]
Glycerine (CP)	5[illegible]
Glycerine (IW)	5[illegible]
Hydrogen Peroxide 50% (Resale)	2[illegible]
Isopropyl Alcohol	3[illegible]
Isobutyl Alcohol (Resale)	3[illegible]
Monoethanolamine (Resale)	9[illegible]
Melamine	6[illegible]
Methyl Ethyl Ketone	2[illegible]
Methyl Isobutyl Ketone	3[illegible]
Methyl Acrylate	6[illegible]
Methylene Dichloride (Resale)	1[illegible]

Carbitol	64+ST
Meta Cresol	45.00
Nitrobenzene	19.00
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	35.00
Propylene Glycol	50.00
Polyethylene Glycol (No.200)	58.00
Polyethylene Glycol (No.400)	60.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	80.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	45+ST
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	28.00
Triethanolamine (Resale)	88.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	50.00

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	12.50
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	11.00
Xylene	21.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	170.00
Aceto Acetic Ester (Methyl)	72.00
Ammonium Molybdate	210.00
Anthraquinone	145.00
Anthranilic Acid	78.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	350.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	95.00
Bromamine Acid	550.00
BON Acid	130+Ex+Ta
Chicago Acid (Atul)	355.00
Coach Acid	52.00
C. Acid (Imp.)	210.00
Cyanuric Chloride	150.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	75.00
Diethyl Aniline	160.00
Diamino stilbene disulphonic acid	168.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	205.00
H. Acid (Atul)	115.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	350.00
J. Acid Urea	410.00
K. Acid	125.00
MPDS (German)	185.00
MNA	140.00
Meta Ureido Aniline	230.00
MPD (Local)	205.00
MPD (Japan)	240.00
Naphthenic Acid	25.00
N-Methyl J. Acid	580.00
N-Methyl Aniline	125.00
Naphthalene (Refined)	23.00
Ortho Anisidine (OA) (Imp.)	108.00
Ortho Dichlcro Benzene (ODCB)	20.00
OT Base	130.00
Para Dichloro Benzene (PDCB)	32.00
Para Anisidine (PA local)	160.00
PNA	120.00
Para Cresidine (Imp.)	410.00
Para Amino Azo Benzene (India)	150.00
PNCB	62.00
Para Amino Acetanilide	190.00
1-Phenyl 3-Methyl 5-Pyrazolone	140.00
Phenyl J. Acid	340.00
Para Amino Benzoic Acid	165.0
PT Base	140.0
Rhoduline Acid	550.0
Resist Salt 80%	28.0
Resorcinol	190.0
Sodium Naphthionate	67.0
5-Sulpho-Anthranilic Acid	80.0
Sulphanilic Acid	33.0
Sulpho Tobias Acid	160.0
Trichloro Benzene (TCB)	24.0
Tobias Acid	166.0
Metanilic Acid	43.0
MTD	120.0

Bombay Dyes Market

(Prices as on February 20, 1990)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60

Red 2B	422
Red FB	425
Red Violet FBL	622
Orange 3R	254
Violet 3R	370
Violet RL	355
Violet 6R	638
Scarlet RR	283
Rubine 3B	289
Rubine CB	449
Blue GL	419
Blue BGF	805
Navy Blue RE	359
Brown 3REL	272
Black GEL	420
Dark Brown 3B	411

BASE COLOURS	Per K
Fast Yellow GC	77
Fast Orange GC	128
Fast Scarlet R	198
Fast Scarlet RC	128
Fast Scarlet RCR	105
Fast Scarlet G	115
Fast Scarlet GN	92
Fast Scarlet GG	77
Fast Scarlet GGS	73
Fast Red B	233
Fast Red RC	115
Fast Red R Flakes	158
Fast Red TR	181
Fast Red TR Oil	223
Fast Red RL	251
Fast Red KB Oil	251
Fast Bordeaux GP	236
Fast Garnet GBC	103
Fast Violet B	548
Fast Blue BB	566

NAPHTHOL COLOURS	Per I
ASG	301
AS	20
ASSW	37
ASBS	25
ASBO	26
ASD	2
ASOL	24

	369.00
	336.05
	236 00
	249.95
	2002.35
	2459.45
	143.00
	538.65
	652.60

ON COLOURS	Per Kg.
Yellow HR	207.95
ellow H4G	145.65
Yellow H-8GP	168.55
ellow HE6G	214.75
G-E4R	276.05
ellow H7G	332.30
M4R	275.45
MGR	387.65
llow M4G	201.15
llow M8G	366.10
M3R	244.70
ange H2R	303.80
d H7B	157.95
ange M2R	313.15
d H8B	213.55
arlet H RN	245.05
ed H-3BP	179.80
d H-F3B	243.45
genta HB	182.00
d M 5B	160.05
d M 8B	218.35
k MB	137.10
genta MB	163.65
pe H-3R	219.55
pie H-7R	175.40
e H 3R	333.75
e H-GR	406.40
e H5G	207.95
RX	286.20
H 7G	213.95
H 7RX	358.15
HA	265.05
ue H-3RP	595.30
rquoise H 2G P	181.50

Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: FEB. 9, (NNS) A mixed trend prevailed in the local chemicals market during the week under review, reports NNS. Tartaric acid recorded a sharp rise of Rs. 400 in the absence of fresh import from France while chatkolite and titanium anatase suffered a loss as a result of adequate stock and poor offtake.

Tartaric acid France recorded a sharp rise of Rs. 400 at Rs. 15,800 per 50 kg in the absence of fresh import from France. In the beginning of January its prices were quoted at Rs. 13,600. Tartaric acid Trishul brand jumped by Rs. 75 at Rs. 4,650/15 kg in sympathy. Demand was stated to be better from cheese manufacturers. Ammonia bicarb and soda bicarbonate registered a rise of Rs. 5 per 50 kg at Rs. 145 and Rs. 290/310 respectively due to better demand and inadequate stock. Soda ash NAL suffered a loss of Rs. 2 at Rs. 340/357, while soda ash Tata brand improved by Rs. 2 per bag. Following poor arrivals from Sambhal, Muradabad, Rampur, Amroha areas of U.P. coupled with local as well as Pakistan demand, menthol flake and bold registered a rise of Rs. 15/20 at Rs. 330 and Rs. 395/kg respectively. Menthol oil improved by Rs. 10 at Rs. 240/260 on better stockists support. Hydrogen peroxide showed a gain of 25 paise per kg at Rs. 26.75/27.50. Mercury rose to a new high of Rs. 11,500 per flask showing a rise of Rs. 300.

For want of buying support, sodium nitrite suffered a loss Rs. 50/75 at Rs. 950/1000 per 50 kg. Sodium nitrate suffered a fall of Rs. 10 at Rs. 440 following lack of enquiries. Following increase in arrivals from Bombay, citric acid (China) suffered a steep fall of Rs. 45 at Rs. 2,080/50 kg while Bombay Dyeing citric acid remained firm at its previous level of Rs. 2,450. Chatkolite drifted lower by Rs. 3.50 at Rs. 53.50/kg due to poor demand from textile sectors. Sufolite showed a loss of Re. 1 at Rs. 67 due to poor offtake. Due to nervous selling by stockists coupled with poor offtake, titanium dioxide slipped by Rs. 4 at Rs. 74/kg. Titanium dioxide K-brand of Calcutta moved down by Rs. 2 at Rs. 75/kg while titanium dioxide RC-822 remained stable at Rs. 94. Demand was stated to be poor from the manufacturers of dyes and colours and plastic and paint units. Caustic acid flake and boric acid technical drifted lower by Rs. 10/25 at Rs. 515 and Rs. 1,325 respectively.

(DELHI MARKET RATES AS ON FEBRUARY 16, 1990)

Ammonia Bicarb (Per 25 Kg.)	145.00
Mercury (Per flask)	11,500.00
Soda ash (Per bag)	340/357.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	515.00
Citric acid (Per 50 Kg.)	2,080/2,450.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCI (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	290/310.00
Sodium Hydrosulphite (Per Kg.)	34.00/36.50
Rangolite (Per Kg.)	90.00
Tartaric acid (Imp) (50 Kg.)	15,800.00
Sufolite (per Kg.)	67.00
Chatkolite (per Kg.)	53.50
DMO	120.00
Boric acid Technical (Per 50 Kg.)	1,325.00
Paraffin Wax (Per 50 Kg.)	850.00
Tartaric Acid (Indian Per 15 Kg.)	4,650.00
Borax Granular (Per 50 Kg.)	835.00
Borax Crystal (Per 50 Kg.)	835.00
Sodium Nitrite (Per 50 Kg.)	900/1,000.00
Sodium Nitrate (Per 50 Kg.)	440.00
Camphor Thai (Per Kg.)	104.00
Camphor Powder (Per Kg.)	95.00
Menthol Bold (Per Kg.)	395.00
Menthol Medium (Per Kg.)	375.00
Menthol Flake (Per Kg.)	33
Menthol Oil (Per Kg.)	240/26
Glycerine (Per Kg.)	55/5
Sodium Silicate (Per quintal)	275/35
Hexamine (Per Kg.)	3
Acetic Acid Glacial (Per Kg.)	1
Copper Sulphate (Per quintal)	2,400/2
Formic Acid (Per Kg.)	2
Formaldehyde (Per Kg.)	
Hydrogen Peroxide (Per Kg.)	26.50/2
Calcium Carbonate (Per Tonne)	2,500/4
Acid Slurry Soft (Per Kg.)	3
Acid Slurry Hard (Per Kg.)	3
Phosphoric Acid (Per 50 Kg.)	1,0
Potassium Nitrate (Per quintal)	900/1,2
Potassium Permanganate (Per 50 Kg.)	2,800/3,2
Sodium Bichromate (Per 50 Kg.)	1,575/1,6
Trisodium Phosphate (50 Kg.)	6
Titanium Dioxide Anatase (Per Kg.)	
Titanium Dioxide RC-822 (Per Kg.)	
Titanium Dioxide K-Brand (Per Kg.)	
Titanium Dioxide RCR-2 (Per Kg.)	
Zinc Oxide (Per metric tonne)	42,000/48,0
Phenol Carbolic Acid (Per Kg.)	
Carbon Tetrachloride (Per Kg.)	
Chloroform (Per Kg.)	
Sodium Sulphate (Per metric tonne)	3,400/3,6
Naphthalene Balls (Per 50 Kg.)	1,4

DYES & COLOURS	(Pe
Naphthol AS	175/
Naphthol ASG	180/
Naphthol ASBS	210/
Naphthol ASTR	275/
Naphthol ASOL	210/
Naphthol ASBO	195/

DIRECT DYES	(Pe
Black E. Conc.	120/
Diazo Black B.T.	105/
Green B	90/
Blue 2-B	60/
Blue 2-B 225% (JNR)	
Sky Blue FB	160/
Basic Auramine	56/
Basic Rhodamine	300/
Basic Methylene Blue	100/
Basic Violet	165/
Basic Malachite Green	
Acid Orange	75/
Congo Red H/C	75/

Madras Market

Trading has been satisfactory spite of the downtrend in the arket. DCM bleaching powder ces were quoted at Rs. 90 per g of 25 kgs. on reported lowering prices by manufacturers. Sorbitol ces went further down on pressure selling by manufacturers. There was brisk activity in NOCIL solvents on account of their proposed maintenance shutdown from next month beginning. Barring minor changes in prices the markets for other items maintained previous levels.

(MADRAS MARKET RATES AS ON FEBRUARY 17, 1990)

tic Acid Glacial (per kg)	14.50
minium Sulphate Iron free per MT)	3,500.00
monium Bicarbonate per 25 kgs)	150.00
monium Chloride (per MT)	2,800.00
d Slurry (per kg)	31.00
ium Carbonate (per kg)	8.00
ium Chloride (per kg)	7.00
c Acid Technical (per kg)	25.00
aching Powder (per 50 kgs)	200.00
ax (per 50 kgs)	725.00
ustic Soda Flakes – Mettur hemicals (per MT)	10,800.00
ustic Soda Flakes -- Andhra ugars (per MT)	10,800.00
cium Chloride 70% Solid per MT)	3,000.00
cium Chloride Anhydrous per MT)	5,750.00
cium Carbonate (Activated) per MT)	6,000.00
Calcium Carbonate (Precipitated) (per MT)	5,250.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.50
Cresylic Acid 98-99% (per kg)	130.00
Pure Para Cresol 96% (per kg)	85.00
Meta Para Cresol 42% (per kg)	49.00
Formic Acid (per kg)	25.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	54.00
Hydrosulphite of Soda (TCPL) (per kg)	37.00
Hydrosulphite of Soda (IDI) (per kg)	40.00
Hydrosulphite of Soda (BASF) (per kg)	40.00
Hexamine (per kg)	31.00
Hyflosupercell (per kg)	22.00
Hydrogen Peroxide (per kg)	31.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	39.00
Magnesium Carbonate (per kg)	18.00
Magnesium Chloride (per kg)	3.25
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	375.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	17.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	25.50
Polyvinyl Alcohol Powder (per kg)	120.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	360.00
Soda Ash (TATA) (per 75 kgs)	360.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	14.00
Sodium Bisulphite (per kg)	7.50
Sodium Alginate (per kg)	238.00
Sodium Acetate (per kg)	7.00
Sodium Sulphate (Anhydrous) (per kg)	3.50
Titanium Dioxide (Anatase) (per kg)	75.00
Titanium Dioxide (Rutile) (per kg)	90.00
Trisodium Phosphate (per kg)	12.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	52.00
Zinc Chloride Powder (per kg)	12.00
Zinc Sulphate (per kg)	8.00

SOLVENTS

Acetone -- HOCL (per kg)	18.50
Butanol (per kg)	34.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	14.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	20.00
Chloroform (per kg)	29.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	40.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	45.00
Di-N-butyl Phthalate (per kg)	45.00
Ethyl Acetate (per kg)	21.50
Isopropyl Alcohol (per kg)	29.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	22.00
Methyl Ethyl Ketone (per kg)	32.00
Methyl Isobutyl Ketone (per kg)	41.50
Phenol (per kg)	38.00
Sorbitol (per kg)	11.00
Triethanolamine (per kg)	90.00
Trichloroethylene (per kg)	25.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	15.00
Xylene (per lit)	22.00

International Bulk Chemical Prices

Spot Prices are as on January 31

Product	European Spot price range ($/ton)	US Spot price range ($/ton)
Ethylene	380- 390 (cif)	463 (Spot)
Propylene (100% basis)	345- 363 (cif)	309- 330 (spot)
Butadiene	620- 640 (fob)	683- 760 (spot)
Benzene	395- 397 (fob)	435- 438 (spot)
Toluene	310- 315 (fob)	350 (spot)
Xylenes (Virgin)	295- 300 (fob)	319 (spot)
(Solvent)	295 (fob)	n.a.
Styrene	1015- 1020 (T2) (fob) 1000 (T1) (cif)	1013- 1102 (spot)
Paraxylene	410- 425 (fob)	562
Orthoxylene	320- 325 (fob)	n.a.
Ammonia	125- 130 (cif)	n.a.
Methanol	125- 128 (T2) (fob) 104-109 (T1) (cif)	n.a.
Naphtha	198- 200 (cif)	n.a.

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Appr sailing (5)
21/2	Moji	Kanika	Antwerp; Rotterdam; Hamburg; Le Havre; Genoa; Gothenburg; Stockholm; Copenhagen; Oslo; Helsinki; London; Felixstowe; Tilbury. (Carting at T.P. No. 3).	28/
26/2	CMB Plantin (Nhava Sheva)	C.M.B.	Djibouti; Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Carting at Kalamboli)	28/
24/2	S/o. Orissa (Ind)	S.C.I.	M.D. Carrara & Antwerp; Rotterdam.	5/3
24/2	Eagle Nova	F.F.C. Co.	Jeddah; P. Sudan; Hodeidah. (Carting at Timber Pond No. 1).	28/
25/2	Ville De Colombo (Ger) (Voy-2212)	C.M.A.	Jeddah; Marseilles; Istanbul; Barcelona; Le Havre; Hamburg; Felixstowe; Rotterdam; Antwerp; Limassol; Lattakia; Tunis. (Carting at W.B. No. 3).	28/
26/2	Seacrest Achiever (V-208) (Ger)	Merzario	Jeddah; Hodeidah; P. Sudan; Ravenna; Ancona; Piraeus; Venice; Trieste. (Carting at M.O.D. No. 1).	3/3
		Seaspeed/	Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Scandinavian ports. (Carting at M-176 Cotton Depot).	
		L. Triest/	Jeddah; Trieste; Venice; Ravenna; Rijeka; Naples. (Carting at M-171/173 Cotton Depot).	
		Oceanic/	P. Said; Limassol; Alexandria; Casablanca; Tripoli; Livorno; Genoa; Mersin; Iskendren; Izmir. (Carting at Wadi Bunder No. 3).	
		Killick/	Jeddah; Felixstowe; London; Liverpool; Manchester; Bristol; Avonmouth; Leeds; Glasgow; Tilbury; Birmingham; Dublin; Belfast; Rotterdam; Hamburg; Le Havre; Antwerp; Bremen; Bremerhaven; Fos; Valencia; Marseilles; Barcelona and Scandinavian ports. (Carting at E-Shed Grain Depot).	
		U.L.A.	P. Sudan; Aden; Djibouti; Hodeidah. (Carting at 14-VD).	

(2)	(3)	(4)	(5)
Tibor Szamuely (Rus) (V-106 W/B)	Transocean	Odessa; Izmail; Reni (U.S.S.R.); Russe; Bulgaria; Budapest (Hungary); Linz; Vienna (Austria); Bratislava (Czechoslovakia); Deggendorff; Regensborg (West Germany) (all ports on River Danube) (Carting at N/O-PD & G-PD).	28/2
Buzet (Yug)	Oceanic	P. Said; Med. ports, (Carting at Wadi Bunder No. 3).	5/3
Maersk Clementine	Volkart Fleming	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K & Scandinavian ports. (Carting at M.O.D. No. 3).	3/3
Alkantara (Egy)	M.C.S.	P. Said; P. Suez; Alexandria. (Carting at 12-VD).	5/3
Menkar (Cyp)	P&O	Assab; Djibouti; P. Sudan. (Carting at Timber Pond No. 4).	2/3
Archimedes (Nhava Sheva)	Patvolk/ S.W. & Co./ Trident/ P&O	Tilbury; London; Felixstowe; Avonmouth; Manchester; Liverpool; Glasgow; Leeds; Birmingham; Dublin; Belfast; Bristol; Marseilles; Genoa; Barcelona; Le Havre; Antwerp; Rotterdam; Hamburg; Bremerhaven; Copenhagen; Oslo; Helsinki; Malmao; Gothemburg; Stockholm; Aarhus; Alborg. (Carting at Kalamboli for all).	3/3
Together (Voy-2)	Sitara	Karachi; (Afghanistan)	1/3
Eagle Nova (V-09) (Cyp)	F.F.C. Co.	Penang; P. Kelang; Singapore; Bangkok; Jakarta; (T. Priok); Hondkong; Manila; Busan; Keelung; Kaohsiung; Kobe; Yokohama; Nagoya; Osaka; Tokyo; Tsingtao; Dairen; Quangzhou; Whampoa; Shanghai; Hsingkang. (Carting at Timber Pond No. 1).	28/2
Eagle Nova	F.F.C. Co.	Brisbane; Freemantle; Sydney; Melbourne; Adelaide. (Carting at T.P. No. 1).	28/2
Eagle Nova (V-09)	F.F.C. Co.	Dubai; Sharjah; Abu Dhabi; Doha; Muscat; Dammam; Riyadh; Bahrain; Kuwait. (Carting at Timber Pond No. 1).	28/2
CMB Plantin (Nhava Sheva)	C.M.B.	Dubai; Abu Dhabi; Bahrain; Kuwait; Dammam; Doha. (Carting at Kalamboli)	28/2
Ville de Colombo	C.M.A.	Dubai; Mina Qaboos; Abu Dhabi; Bahrain; Doha; Dammam; Riyadh; Kuwait; Iraq. (Carting at Wadi Bunder No. 3).	28/2
Seacrest Achiever (V-208)	Parekh/	Muscat; Dubai; Sharjah; Abu Dhabi; Bahrain; Dammam; Kuwait; Baghdad. (Carting at Timber Pond No. 3).	3/3
	Merzario/	Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Dammam; Kuwait; Bahrain. (Carting at M.O.D. No. 1 for Merzario).	
	L. Triest/	Dubai; Dammam; Riyadh; Muscat; Abu Dhabi; Doha; Kuwait; Bahrain. (Carting at 171/173 Cotton Depot).	
	Seaspeed/	Dubai; Dammam; Bahrain; Kuwait; Doha. (Carting at AM-176 Cotton Depot).	
	Sai Ship/	Dubai; Muscat; Sharjah; Abu Dhabi. (Carting at W.B. No. 3).	
	Killick/	Dubai; Dammam; Riyadh; Bahrain; Kuwait. (Carting at E-Shed Grain Depot).	
	U.L.A./	Dubai; Kuwait; Bahrain; Riyadh; Abu Dhabi; Doha. (Carting at 14-VD)	
	O.S.A.	Dubai; Abu Dhabi; Bahrain; Doha; Muscat; Kuwait; Dammam. (Carting at M-178/180 Cotton Depot).	
Maersk Clementine	V. Fleming	Dubai; Dammam; Muscat; Bahrain; Kuwait; Riyadh; Doha. (Carting at M.O.D. No. 2).	3/3
CMB Plantin (Nhava Sheva)	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans; Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli).	28/2
Hoegh Dene	Palvolk	Montreal & Toronto; Via Halifax; New York; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans; & FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5).	28/2
Eagle Nova (V-09)	F.F.C. Co.	Los Angeles (Harbour); Longbeach; San Francisco; Oakland; Seattle; Vancouver (B.C.); Portland; New York; Boston; Norfolk; Baltimore; Charleston; Savannah; Miami; New Orleans; Houston; Montreal; Toronto; Fortworth; Chicago; Nashville; Atlanta; Philadelphia; Milwaukee; Kansas City; Phoenix; Guam; Dallas; Cleveland; St. Louis; Cincinnati; Denver; Louisville; Memphis; Wilmington (B.C.); San Diego; Minneapolis; Indianapolis and Central American Ports; Honolulu. (Carting at Timber Pond No. 1).	28/2
Seacrest Achiever (Voy-208)	Seaspeed	New York; Baltimore; Norfolk; Savannah; Charleston; Houston & S. American ports. (Carting at M-176 Cotton Depot).	3/3
Maersk Clementine (Sing)(V-9005)	Volkart Fleming	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chigaco; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit;	3/3

(1)	(2)	(3)	(4)	(5)
			Minneapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; San Francisco; Portland; Longbeach; Mexican and S. American ports. (Carting at M.O.D. No. 2).	
28/2	Buzet (Yug)	Oceanic	New York; Baltimore; Philadelphia; Chicago; Boston; Norfolk; Atlanta; Charleston; /savannah; Miami; Houston and other inland destinations in U.S. East Coast and S. American ports. (Carting at Wadi Bunder No. 3).	3/3
1/3	Archimedes (Nhava Sheva)	Patvolk/P&O/ S.W.& Co./ Trident	S. American ports. (Carting at Kalamboli for all). New York; Norfolk; Savannah; Baltimore; Boston; Charleston; Houston.	3/3
26/2	CMB Plantin (Nhava Sheva)	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at Kalamboli).	28/2
26/2	Seacrest Achiever	Seaspeed	West African ports. (Carting at M-178 Cotton Depot).	3/3
28/2	Maersk Clementine	V. Fleming	Lagos/Aqapa; Dakar; Freetown; Monrovia; Lome; Cotonou; Douala; Tema. (Carting at M.O.D. No. 2).	3/3
1/3	Archimedes (Nhava Sheva)	Patvolk/P&O/ S.W.& Co.	West African ports. (Carting at Kalamboli for all).	3/3
22/2	Vishva Nandini (Ind)	S.C.I.	P. Louis; Mombasa; Dar Es Salaam; Beia (Direct) & Inland Destinations in East Africa. (Carting at T.P. No. 1).	2/3
24/2	Banglar Moni (Voy-7).	Sai Ship	Mombasa; Dar Es Salaam. (Carting at Wadi Bunder No. 3).	28/2
26/2	CMB Plantin (Nhava Sheva)	C.M.B.	Dar Es Salaam; Mombassa (Direct); Nacala; Tanga; Kampala; Blantyre; Lusaka; Ndola; Matwara; Lilongwe; and all inland destinations in East Africa. (Carting at Kalamboli).	28/2
28/2	Menkar (V-02) (Cyp)	Arebee/	Dar Es Salaam & Mombassa (Direct); Kampala; Jinja; Toronto; Lugazi; Entebee (Uganda); Kigali; (Rwanda); Kitwe; Lusaka; Ndola (Zambia); Lilongwe; Blantyre (Malawi); Maputo; Zanzibar. (Carting at M.J.C.D.).	2/3
		P&O	Mombasa; Dar Es Salaam (Direct); Beira; Mahe and inland destinations in East Africa. (Carting at Timber Pond No. 4).	

VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Seamer's Name	Agents	From
7/3	Brest	Transocean	Med. Ports.
28/2	Buzet	Oceanic	Med./U.S.
2/3	B. Oldendorff	Prudential	Cont.
1/3	Dorothee (V-7)	Merzario/Samrat	U.K. Cont.
3/3	Ind. Renown	I.S.S. Co.	U.K. Cont.
28/2	Kapitan Kud	Transocean	U.K. Cont.
28/2	Maersk Clementine (V-9005)	Volkart Fleming	U.S.A.
6/3	Moscenice	Oceanic	Adriatic ports.
2/3	Rumija	S.C.I.	U.K. Cont.
28/2	Rovno	Transocean	Med. Ports.
1/3	S/o. Nagaland	S.C.I.	Japan/F. East
5/3	Volosko	Oceanic	Adriatic

Materials Imported

PLASTIC MATERIALS IMPORTED BOMBAY
(From 29.12.89 to 30.12.89)
ontinued from previous issue)

LYPROPYLENE: From FRG: al Plastic Inds., 124 MTs., 16,01,720; From Spain: Hari nu Packaging Ltd., 99 MTs., 1,94,662; Naresh Traders, 49.5 ., Rs. 5,97,357; Narmada Plastic Ltd., 82.5 MTs., Rs. 9,95,553; tra Plastics Ltd., 49.5 MTs., ,97,331; From UK: Sumitra Plas- Ltd., 97.725 MTs., Rs. 11,76,864; USA: Conexco, 32.997 MTs., ,00,989; Deccan Polypacks Ltd., MTs., Rs. 5,97,332; Kalyani prises, 82.5 MTs., Rs. 9,81,531; United Polypropylene Ltd., 32,002 Rs. 7,05,349; Shah Enterprise, MTs., Rs. 59,733; Shah Industrial oration, 51 MTs., Rs. 5,41,752; Yugoslavia: Grover Overseas Pvt. 31 MTs., Rs. 4,06,276; India aging Products, 15.5 MTs., ,06,780.

LYSTYRENE: From Korea: at International, 100 MTs., 3,97,678; Calcom Electronics Ltd., Ts., Rs. 5,13,032; Chhajed Plas- 25 MTs., Rs. 3,92,012; Ridhi Plas- t. Ltd., 68 MTs., Rs. 9,93,936; The Supreme Inds. Ltd., 25 MTs., Rs. 3,49,651; NA, Rs. 10,48,953.

STYRENE: From USA: Milton Plastics, 18.371 MTs., Rs. 4,40,243.

MATERIALS IMPORTED MADRAS
(From 13.12.89 to 19.12.89)

N-ACETYL SULPHANILYL CHLORIDE: From Japan: Standard Organic Ltd., 20 MTs., Rs. 9,90,369.

ACRYLONITRILE: From FRG: IDPL, 29.6 MTs., Rs. 7,13,785.

2-AMINO THIOPHENOL: From Japan: Cheminor Drugs Ltd., 1,000 Kgs., Rs. 2,71,936.

AMMONIUM PERSULPHATE: From FRG: Triton Valves Ltd., 1,000 Kgs., Rs. 24,557; From Japan: ICI India Ltd., 4,000 Kgs., Rs. 88,065.

AROMATIC CHEMICALS: From France: Karnataka Soaps & Detergents Ltd., 600 Kgs., Rs. 1,63,474.

TER. BUTYLAMINE: From Japan: Neuland Labs Ltd., 3,080 Kgs., Rs. 1,60,137; Standard Organics Ltd., 3,080 Kgs., Rs. 1,69,526.

D-CALCIUM PANTOTHENATE USP/BP: From Japan: Remixdex Japan Pvt. Ltd., 500 Kgs., Rs. 1,12,623.

CHOLINE CHLORIDE 50%: From FRG: Tetragon Chemie Pvt. Ltd., 22,500 Kgs., Rs. 3,50,568.

CHLORO ACETYL CHLORIDE: From Japan: Astra Industrial Ltd., 2,000 Kgs., Rs. 61,430.

4-CYANOPYRIDINE: From Belgium: Bansal Metallic Oxides, 5,000 Kgs., Rs. 4,02,221; From UK: Bansal Metallic, 5,000 Kgs., Rs. 3,85,286.

4-CYANOPYRIDINE MIN. 98%: From Japan: Pradeep Drug Co., 4,000 Kgs., Rs. 3,12,293.

CYCLOHEXANONE: From FRG: Murugappa Electronics Ltd., 9,120 Kgs., Rs. 2,10,549.

DIALLYL PHTHALATE: From Netherlands: Excel India, 100 Kgs., Rs. 23,554.

DIMETHYL CARBONATE: From Italy: Dr. Reddy's Labs Ltd., 16,380 Kgs., Rs. 4,64,695.

DIMETHYL SULPHOXIDE: From USA: Globe Organics Ltd., 31,752 Kgs., Rs. 8,60,384.

ETHYLENE GLYCOL: From FRG: Keltron Components Ltd., 5,500 Kgs., Rs. 1,34,380.

ETHYL HEXYL CHLORO FORMATE: From France: Peroxides India Ltd., 14,040 Kgs., Rs. 5,46,886.

GAMMA FERRIC OXIDE: From

Japan: Murugappa Electronics, 2,500 Kgs., Rs. 2,29,763; From Singapore: Prakash Pipes & Inds., 9,000 Kgs., Rs. 8,83,305.

GALLIC ACID: From Hong Kong: Arka Labs Pvt. Ltd., 2 MTs., Rs. 2,03,228.

GLYOXYLIC ACID: From Japan: ICI India Ltd., 500 Kgs., Rs. 1,06,018.

HYDROXYLAMINE SULPHATE: From FRG: Siris Ltd., 18 MTs., Rs. 5,19,308; From USA: SOL Pharmaceuticals Ltd., 16,000 Kgs., Rs. 4,64,685.

IODINE CRUDE: From Japan: Eskayef Ltd., 6,000 Kgs., Rs. 20,37,870.

ISOEUGENOL: From Singapore: N. Ranga Rao & Sons, 200 Kgs., Rs. 31,331.

ISOBUTYL BENZENE PURE: From USA: Sumitra Pharmaceuticals & Chem, 40,971 Kgs., Rs. 22,55,077.

ISOPROPYL ALCOHOL: From Singapore: Shasun Drugs, 26,000 Kgs., Rs. 3,09,550.

ISOPROPYLAMINE: From FRG: The Mettur Chem. & Industrial Corpn., 700 Kgs., Rs. 42,074.

LACTOSE: From Netherlands: Kawarlal & Co., 38,000 Kgs., Rs. 5,71,770.

LYRAL: From Netherlands: Padmini Products, 400 Kgs., Rs. 1,32,128.

METHYL ACETO ACETATE: From Japan: Shasun Chemicals Ltd., 16 MTs., Rs. 3,68,598.

D-ALPHA PHENYL ETHYL AMINE: From Japan: Cheminor Drugs Ltd., 360 Kgs., Rs. 2,56,49,992.

PHOSPHORIC ACID: From Namibia: MFL, 15,402 Kgs., Rs. 10,74,15,519.

POLYPHENYLENE OXIDE: From Japan: Electronic Res. Ltd., 4,000 Kgs., Rs. 3,66,626.

PROPYLENE GLYCOL USP: USA: Muthu Meena Agencies, Kgs., Rs. 77,994.

PYRIDINE: From Belgium: Ltd., 15,200 Kgs., Rs. 9,16,421; Japan: IEL Chemtech Pvt. Ltd., MTs., Rs. 1,18,166.

SODIUM BOROHYDRIDE: FRG: Neuland Labs Ltd., 510 Rs. 1,16,888.

SODIUM METAL: From Pancom Marketing Pvt. Ltd., MTs., Rs. 77,712; From Japan: Exporters Ltd., 9.86 MTs., Rs. 3,5

STYRENE OXIDE: From Arvee Chem Pharma Pvt. Ltd., Kgs., Rs. 1,22,074.

STYRENE MONOMER: USA: Naphtha Resin & Chem Ltd., 17,600 Kgs., Rs. 2,83,164

TITANIUM DIOXIDE: From Addisons Paints & Chemicals MTs., Rs. 8,16,640.

TRIMETHYL ORTHO FORM From FRG: Dr. Reddy's Labs 14,400 Kgs., Rs. 12,46,340.

TRIMETHOXY BENZA HYDE: From Netherlands: In Chemicals Pvt. Ltd., 3,150 Rs. 12,29,120.

3,4,5 TRIMETHOXY BEN DEHYDE: From Japan: Aditya C ics Pvt. Ltd., 2,010 Kgs., Rs. 12,2 Standard Organics Ltd., 2,010 Rs. 8,47,335; From Netherlands: taa Chemicals Pvt. Ltd., 3,150 Rs. 12,29,120.

PLASTIC MATERIALS IMPORTED MADRAS (From 13.12.89 to 19.12.8

HDPE: From Brazil: Dar Inter 16.5 MTs., Rs. 2,10,812; Enterprises, 33 MTs., Rs. 4, From Japan: Mani & Co., 50 Rs. 6,69,694; Polyspin Pvt. Ltd. Kgs., Rs. 3,92,258; Sun Poly Sa

16.5 MTs., Rs. 2,18,724; From erlands: Rabbani Exports, 17 MTs., ,08,735; From Singapore: Inted Exports, 17 MTs., Rs. 2,28,882; nce Plastics Ltd., 16.98 MTs., 2,22,528; From USA: Dhanaplast 6.804 MTs., Rs. 80,085; From : VV Dhanushkodi Nadar Sons, MTs., Rs. 80,085.

LYPROPYLENE: From Japan: eer Plastics, 46,500 Kgs., ,25,781; Polyspin Pvt. Ltd., 30 ., Rs. 3,76,977; From Singapore: yfilm Inds., 16,000 Kgs., 2,27,615; From USA: Super Pack-34 MTs., Rs. 4,35,331.

LYSTYRENE: From Korea: Surya Plastics Pvt. Ltd., 34 MTs., ,38,384.

UG MATERIALS IMPORTED BOMBAY
(From 29.12.89 to 30.12.89)

URAZOLIDONE BP 80: From a: Chemie Pharmie, 100 Kgs., 1,27,157.

IDOMETHACIN: From China: i Pharma Drug House, 2,750 Kgs., 1,12,175; Parke Davis India Ltd., 0 Kgs., Rs. 1,12,175.

EFENEMIC ACID BP 80: From a: Bluecross Labs Ltd., 1,000 Kgs., ,97,156.

YRIDOXINE HYDROCHLO-E USP: From Japan: Dilip Kumar o., 1,600 Kgs., Rs. 72,472.

DDIUM D-PANTOTHENATE: n Japan: Parke Davis India Ltd., Rs. 2,25,870.

MATERIALS EXPORTED MADRAS
(From 1.12.89 to 14.12.89)

ROMATIC CHEMICALS: To .: Bush Boake Allen (India) Ltd., 1 Rs. 27,900.

ALCIUM SENNOSIDE: To R: Usha Intercontinental (India), 7,000 Kgs., Rs. 34,09,000.

L-TYROSINE: To USA: Srinivasa Cystine Ltd., 1,000 Kgs., Rs. 3,15,000.

SODIUM SILICATE: To Oman: Raj Impex, 18,500 Kgs., Rs. 67,438.

DRUG MATERIALS EXPORTED MADRAS
(From 1.12.89 to 14.12.89)

AMPICILLIN TRIHYDRATE: To USSR: Chemicals Ltd., 5,000 Kgs., Rs. 49,00,000.

ERYTHROMYCIN: To Singapore: Pradeep Drug Co., 300 Kgs., Rs. 2,56,100.

ERYTHROMYCIN ESTOLATE: To Bangkok: Pradeep Drug Co., 200 Kgs., Rs. 1,85,550.

ETHAMBUTOL HCl BP 80: To Singapore: Medchl Chem & Pharma Private Limited, 1,000 Kgs., Rs. 5,31,476.

IBUPROFEN: To Canada: Shasun Drugs, 50 Kgs., R. 14,640.

IBUPROFEN BP 80: To FRG: Shasun Drugs, 1,000 Kgs., Rs. 2,31,385.

IBUPROFEN BP 88: To FRG: Shasun Drugs, 3,000 Kgs., Rs. 6,94,153.

IBUPROFEN USP XXII & BP 88: To USA: Cheminor Drugs Ltd., 20,000 Kgs., Rs. 46,22,154.

ISONIAZID BP: To FRG: Veer Chemie & Aromatics Pvt. Ltd., 1,500 Kgs., Rs. 2,26,400.

ISONIAZID: To Hong Kong: Veer Chemie & Aromatics Pvt. Ltd., 1,000 Kgs., Rs. 1,47,500.

ISONIAZID BP 80: To Hong Kong: Veer Chemie & Aromatics Pvt. Ltd., 1,000 Kgs., Rs. 1,47,500.

MEBENDAZOLE: USP XXI: To Thailand: Pradeep Drug Co., 200 Kgs., Rs. 94,700.

MATERIALS IMPORTED BOMBAY (From 4.1.1990 to 8.1.1990)

ACETOPHENONE: From FRG: S.D. Fine Chem. Pvt. Ltd., 3,000 Kgs., Rs. 66,793.

ACETYLENE BLACK: From France: Cable Corpn. of India Ltd., 3,000 Kgs., Rs. 2,16,010; From Japan: Bharat Electronics Ltd., 2.5 MTs., Rs. 1,13,609.

ACRYLAMIDE: From Japan: Swan Products, 15,000 Kgs., Rs. 3,86,809.

ACRYLIC ACID: From Japan: Arofines, 50 MTs., Rs. 63,098.

AEROSIL: From FRG: Polycoat Powders P. Ltd., 300 Kgs., Rs. 41,138.

ALKYL DIMETHYLAMINE: From USA: Aquapharm Chemicals Co. P. Ltd., 3.103 MTs., Rs. 1,88,041.

ALPHA ACETA GAMMA BUTYRO LACTONE: From Japan: IDPL, 15,000 Kgs., Rs. 21,99,203.

ALUMINIUM CHLORIDE: From FRG: Fine Chem Corpn., 400 Kgs., Rs. 24,128.

ALUMINIUM OXIDE: From Japan: 6,000 Kgs., Rs. 2,79,589.

AMMONIUM PERSULPHATE: From Japan: Ven Petrochemical & Pharma P. Ltd., 5,000 Kgs., Rs. 1,13,280.

ANISIC ALDEHYDE: From Japan: Thermax Ltd., 32,000 Kgs., Rs. 9,81,971.

ANTIOXIDANT: From USA: Indian Oil Corpn., 12,942 Kgs., Rs. 11,36,949.

AROMATIC CHEMICALS: From FRG: Sai Aromas P. Ltd., 270 Kgs., Rs. 1,29,870; From Japan: Parekh Indl. Enterprises, 6,000 Kgs., Rs. 2,08,877.

ARSENIC TRIOXIDE: From France: Shikobad Glass Industries, 19,800 Kgs., Rs. 1,81,394; Som E prises, 9,900 Kgs., Rs. 90,697.

CAPROLACTAM: From Colo Sonia Intl., 300 MTs., Rs. 82,85

CARBOFURAN TECH.: Japan: Pesticides India, 7,200 Rs. 12,50,165.

CARBON BLACK: From Kores (India) Ltd., 3,400 Rs. 2,28,683; Pepege (Insulatio Pkg. Ltd., 22,000 Kgs., Rs. 90 Samir Dye Chem, 1,000 Rs. 43,323.

8 CHLORO THEOPHYLL From FRG: Searle India Ltd., Kgs., Rs. 77,420.

CHLOROPICRIN: From USA Chemicals Ltd., 4,500 Rs. 2,33,442.

CITRIC ACID MONOHYDR BP: From China: Gupta Trading 17.5 MTs., Rs. 2,54,305.

CITRIC ACID MONO BP 80: UK: IDI Ltd., 17,500 Rs. 2,54,306.

COBALT ACETATE: From The Bombay Dyg. & Mfg. Co. 4,090 Kgs., Rs. 3,79,355.

CYANURIC CHLORIDE 99/ From FRG: Hickson & Dadajee 1,200 Kgs., Rs. 6,23,083.

CYCLOHEXANONE: From Jai Electronic Inds. P. Ltd., 14,820 Rs. 3,59,957.

DL-2 AMINO BUTANOL: FRG: Lupin Labs. Ltd., 15,200 Rs. 21,50,072.

DESMODUR: From FRG: Paints India Ltd., 3,000 Rs. 1,19,823; Mahindra Engg. & C Prod., 4,000 Kgs., Rs. 1,96,397.

4,4-DIAMINODIPHEN METHANE: From Japan: Atlas Ltd., 2,000 Kgs., Rs. 1,22,373.

DIARYL SULPHIDE: From Swami Rubber Industries, 5.1 Rs. 98,313.

DIBUTYLAMINE: From FRG: ·L, NA, Rs. 23,676.

1,3 DICHLOROBENZENE: From ·pan: Ranbaxy Labs Ltd., NA, . 35,692.

DICHLORO ISOCYANURIC CID SODIUM SALT: From Japan: ınjab Woolcombers Ltd., 2,040 Kgs., . 1,57,818.

DIETHYL SULPHATE: From pan: IDI, 15,640 Kgs., Rs. 3,38,388.

DIETHYLENE GLYCOL: From pan: Grauer & Weil (I) Ltd., 11,250 gs., Rs. 1,85,668; From Saudi Arabia: aylex Chemicals, 16.2 MTs., . 1,66,579; From Taiwan: Reliance dustries Ltd., 18,000 Kgs., . 2,65,993.

DIMER ACID: From USA: Gem nthetics & Polymers (India), 4.953 Ts, Rs. 1,06,647.

DIMETHYL ACETAMIDE: From G: J.K. Synthetics Ltd., 99,940 Kgs., . 26,04,265.

N,N-DIMETHYL COCOAMINE: om Belgium: Ahura Chemical Prots Ltd., 3,040 Kgs., Rs. 1,63,464.

DIMETHYL DISULPHATE: From ance: IPCL, 16.77 MTs., 5,37,296.

DIMETHYL FORMAMIDE: From G: Parke Davis India Ltd., 5,130 s., Rs. 97,653.

DIMETHYL UREA: From FRG: Bakul Aromatics & Chemicals, 27,000 Kgs., Rs. 6,86,395; Luke Chemicals Pvt. Ltd., NA, Rs. 1,45,377.

DINITRO TOLUENE PURE: From FRG: Atul Products Ltd., 5,250 Kgs., Rs. 2,40,677.

DIPHENYLMETHANE DIISOCYANATE: From FRG: Milton Polyplast Pvt. Ltd., 1,600 Kgs., Rs. 5,91,427.

EPICHLOROHYDRIN: From Japan: Excel Inds. Ltd., 15.84 MTs., Rs. 4,41,147.

ETHYL THIOETHANOL: From FRG: Trifam Chemache Inds. Pvt. Ltd., 5,000 Kgs., Rs. 1,93,404.

MONOETHYLENE GLYCOL: From Singapore: Garware Plastics & Poly Ltd., 95,175 Kgs., Rs. 18,81,630; From Saudi Arabia: Medipon Fibres Co., 97,200 Kgs., Rs. 16,57,814.

ETHOXY METHYLENE MALONIC ESTER: From France: Ranbaxy Labs Ltd., 5,050 Kgs., Rs. 62,095.

GAMMA FERRIC OXIDE: From FRG: Jai Electronics Inds. Pvt. Ltd., 12,000 Kgs., Rs. 7,08,400.

FORMAMIDE: From FRG: Alembic Chemical Works Co. Ltd., 2,990 Kgs., Rs. 80,800.

FURFURYL ALCOHOL: From Belgium: Polyceramic Inds., 2,060 Kgs., Rs. 66,999.

HEXACHLORO CYCLOPENTADIENE: From USA: Bharat Pulverising Mills Ltd., 90,020 Kgs., Rs. 31,43,230.

HEXAHYDROPHTHALIC ANHYDRIDE: From FRG: Cibatul Ltd., 1,560 Kgs., Rs. 6,17,292.

HEXANE DIOL: From Japan: Jay Synth Dye Chem Ltd., 5,700 Kgs., Rs. 3,92,946.

1-6 HEXANE DIOL: From Netherlands: Rajasthani Trading Co., 18.8 MTs., Rs. 1,99,211.

D(-)PARA HYDROXY PHENYL GLYCINE METHYL POT. DANE SALT: From Netherlands: Gujarat Lyka Org. Ltd., 1,500 Kgs., Rs. 5,65,275.

HYDRAZINE HYDRATE 100%: From USA: Hindustan Ciba Geigy Ltd., 2,400 Kgs., Rs. 1,13,807.

ISOBORNYL ACETATE: From GDR: Dujodwala Industries, NA, Rs. 9,34,250.

ISOBUTYL BENZENE: From USA: The Boots Co. Ltd., 27,314 Kgs., Rs. 15,64,120.

ISOPHTHALIC ACID: From USA: Eemas Resins Private Limited, 2,041 Kgs., Rs. 36,424; Textile Auxiliaries & Chemicals, 6,065 Kgs., Rs. 1,27,672.

ISOPHYTOL: From FRG: E. Merck India Limited, 10,200 Kgs., Rs. 2,45,679.

REGD. NO. TN/MS (C) 395

35th YEAR OF PUBLICATION

ISSN 0045-6500
R.N. NO. 1972/57

Chemical Weekly

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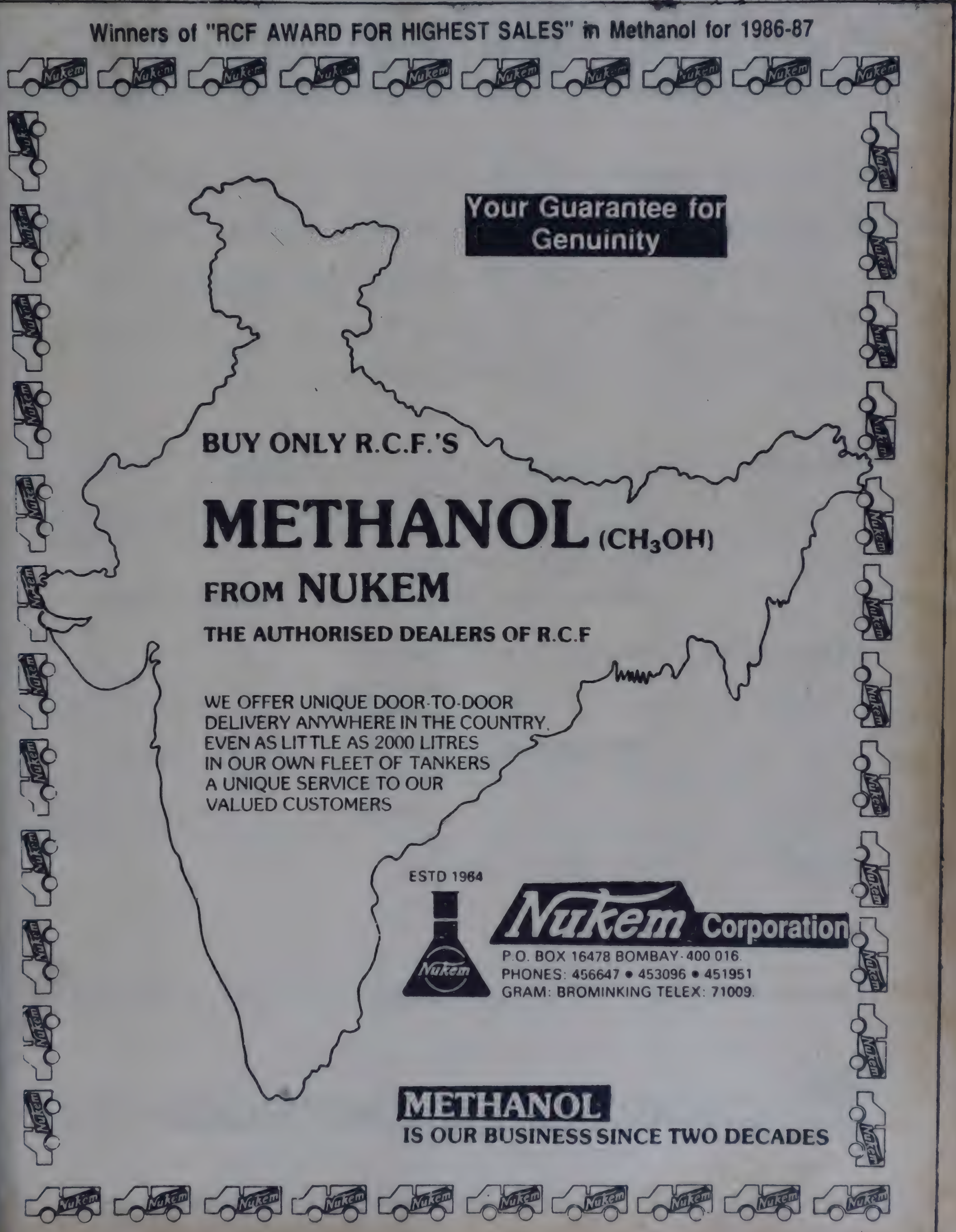

If the history of planet Earth can be seen as 1 day, then,

1) The Human species arrived only 10 minutes ago.
2) Civilization is only 5 seconds old.
3) The Industrial Revolution only 1/8th of a second.
Yet so much has been achieved in 1/8th of a second.

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INT-DESIGN

Chemical Weekly

VOL. XXXV MARCH 6, 1990 NO. 26

Publishers:
SEVAK PUBLICATIONS

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Phone: 831808.
Telex: 041-6290 CWLY IN.

Printed at:
Sevak Publications,
25, North Mada Street, Tiruvanmiyur,
Madras 600 041.

Fast Print Service,
307/308, Shri Hanuman Indl. Estate,
G.D. Ambekar Road, Wadala,
Bombay 400 031.

Subscription Rates:
(Inclusive of Postage)
India: Rs. 400.00
Foreign: US$ 175.00 (Air Mail)
US$ 75.00 (Sea Mail)

Subscription charges payable in advance in favour of SEVAK PUBLICATIONS

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HERALDING THE 21st CENTURY - 41

Will man succeed in the eternal struggle between bread & bullet?

he report of the U.S. Presidential Commission on world hunger "Overcoming world hunger — the challenge ahead" (1980) con- led that poverty is the basic cause of hunger and that poverty and nutrition are usually accompanied by other unsatisfactory living con- ons such as poor health, illiteracy, unemployment, large families, ded housing, contaminated drinking water and open sewage ditches. report said elimination of this syndrome of poverty is necessary vercome the long-term problem of hunger. Economist Prof. Amar- Sen in his "Poverty and Famines —an Essay on Entitlement and rivation", has stated that whereas poverty can reflect relative depri- on as opposed to absolute dispossession, "starvation does imply pov- since the absolute dispossession that characterises starvation is e than sufficient to be diagnosed as poverty, no matter what story rges out of relative deprivation." Hunger is indeed a state of sad rivation that needs to be battled and ended.

ore Hungry People: The sad fact remains that there are more gry people in the world today than ever before. At the opening ses- of the 18th ministerial meeting of the U.N. World Food Council C) in Cairo on May 22, 1989 the WFC president, Mr. Eduardo quera, mentioned that one out of every 10 persons today suffers chronic hunger and that, of the world's population of 5.2 billion, million constitute those afflicted by hunger -- 40 million more than 85. The second report to the Club of Rome, "Mankind at the Turn- Point", brought out in 1974, authored by Messrs. Mihajio Mesar- and Edward Pestel, both members of the Club of Rome, carried nportant brief on world food supply situation and hunger, which also dismissed lightly by critics then. The brief stated in part that regard to world food supply scarcity is produced not only by the sing number of hungry people but also not in the least, by the asing demand of a growing affluent minority.

cording to a World Bank study, reported in the press in 1988, nic hunger and recurrence of virulent famines on a large scale are ain problems facing man. According to this study, about 340 mil- people representing about 16% of the population of developing tries suffer from nutritional depravation that causes stunted growth erious health risk. It estimates that for low-income countries, the of deprived population will be 23%. It also mentions that nearly million people in the developing world would suffer from under- shment without access to enough calories for an active working representing 34% of the population of these countries. A recent d Bank study "The challenge of hunger in Africa: A call for action" (Washington DC, 1989) cautioned that there are no quick fixes, simple short-cuts or easy answers that can make the problem of hunger go away, and that only large-scale action pursued over the years with adequate resources and skilled personnel could alleviate the problem.

Obviously, the solutions to the problem of world hunger and regular deprivation call for policy instruments based on economic, political and social analysis. Although the World Bank's latest annual report (1989) states that the central goal of the Bank is reduction of poverty and the ways to achieve that goal ("whether through supporting structural adjustment measures to lay foundations for sustained growth through investment lending or through its research and country economic sector work") are at the heart of its activities, poverty in developing countries is on the rise as the Bank's World Development Reports (WDRs) for 1988 and 1989 specifically bring out.

A sharp reversal: The 1988 WDR cites a study which has concluded that the number of people below the poverty line increased at least up to 1983-84 in Brazil, Chile, Ghana, Jamaica, Peru and the Phillippines and that there has been a sharp and widespread reversal in the trend towards improved standards of child health, nutrition and education. It also mentions that "other sources show that in two out of 35 developing countries, the daily calorie supply per capita was lower in 1985 than in 1965, and that between 1979 and 1983 life expectancy declined in nine sub-Saharan countries". The global picture of a hungry world becomes all the more tragic and pessimistic when viewed against the background of a mad and crazy arms race indulged in by the developed, developing, underdeveloped and very poor countries.

Spiralling military expenditure: Even those familiar with the grave economic situation in the world's poorest countries mostly in Africa and those suffering the worst effects of the inflationary spiral mostly in Latin America, seldom highlight the basic fact that the maximum damage to the economy has arisen from military expenditure, at least among one third of the third world countries. Forty developing nations have established military installations for aircrafts, tanks, missiles and hardware at a cost of $200 billion dollars mostly because of the never ending game of one-upmanship. Undeniably, the preoccupation shown by some of the poorer countries with arms build-up is indefensible; for instance, Africa, where almost every problem is more acute than elsewhere and most of the world's poorest live, spends 14 per cent or more of the GNP on the military, besides indulging its whim for constant

internecine feuds. Even so, the per capita expenditure on armed forces is still only $43 in developing countries as against $524 in developed countries as a whole, North America alone topping the list at nearly $1000 per capita. It is the industrial countries which are responsible for 97% of weapons exports, the U.S. and the U.S.S.R. between themselves accounting for 72.5%. Two-thirds of the exports originate from NATO nations and 44% from the U.S. The U.S. Congress Research Service has found that the country encourages bankrupt states to buy weapons which they often do not need, paying with money which they often do not have! In 1982-84, American aid for Africa rose by 40%, but this was left far behind by sales and donations of arms which went up by 150% in the same period.

There is no gainsaying the deleterious impact of defence expenditure on the overall investment and savings, agricultural and industrial production, and economic growth and development in developing countries. A U.N. study has disclosed that an average of two working places can be created in civilian sectors for every employee in the military sector. In the U.S. the job increase by diversion of $1 billion from the military to the civilian sector has been computed to be as high as 51,000. The monstrous drain of human and material resources on weapons of warfare and plans of destruction is so mind boggling that it may make no dent on the consciousness of most laymen unless broken into spine-chilling deprivations flowing from it.

Deprivations resulting from world military expenditure:

Out of every 1000 scientists, 200 are occupied with research on arms technology.

Military expenditure of half a day would finance the WHO's entire programme for eradication of malaria all over the world.

The money spent on one modern tank will provide storage for 10,000 tonnes of rice and build 1000 class rooms for 30,000 children.

The money paid for a fighter plane will be enough to equip 50,000 village dispensaries.

The price of a nuclear submarine is equivalent to the education budgets of 23 developing countries with 160 million children of school-going age.

Just half-a-per cent of the annual military expenditure will pay for all the agricultural machinery needed to increase food production and approach self-sufficiency in poor countries by 2000.

Two weeks of military expenditure is enough to fund the annual cost of the proposed U.N. Water and Sanitation Decade.

Four days of military spending will help carry out the action plan for over five years to save the world's tropical fores.

Two days of global arms spending will do to meet the annual cost of the U.N. action plan to halt Third World desertification over 20 years.

Three weeks of military spending of countries with literacy rates of 50% or less will meet the additional budget needs of UNESCO over a decade to eliminate illiteracy world-wide.

One Trident submarine costs as much as the amount needed to implement for a period of five years child immunisation programmes against six deadly diseases, preventing one million deaths a year.

The money spent on just one nuclear weapon test will be enough to instal 80,000 handpumps to provide safe drinking water to villages.

Two-months of Ethiopian military spending will met the annual cost of the proposed U.N. anti-desertification plan for that country.

Just one hour's operating cost of B-1 bomber will ensure community based maternal health care in 10 villages in Africa and reduce maternity deaths by half in one decade.

Ten days of European Community military spending will provide the funds to clean up hazardous waste sites in those countries by the year 2000.

Just 0.1% of the annual military expenditure worldwide is sufficient to treble the present U.N. resources for peace-keeping.

The total estimated cost of all the worthwhile projects identifie the U.N., its agencies and international think-tanks for executic 1990-2000 is just about equal to a year's expenditure on arms and a ments; that is, only one-tenth of the military expenditure is req to meet the cost of the activities every year for the next 10 ye

Concrete Steps: Translating the call for reduced military exp ture into action may not be capable of accomplishment within a na time-frame, but this should not become an alibi for not setting in m in the interim a few concrete steps on the following lines.

(i) A compact among nations agreeing to an *ad hoc* voluntar of 10% of the military budget places $120 billions a year at the posal of the world community. In the light of the response, finer t of the formula for cuts in future years can be made relating the the GNP, the size of the budget, exports and imports of arms, etc. saging a gradation of cuts from a basic minimum to a rational imum. In the case of developing countries or member countri defence blocs, the cuts can be made larger.

(ii) Arms exporting countries should desist from promoting their business by inveigling countries which are in a bad shape or cannot afford them to buy their arms by hardsell canvassing a other ignoble means.

One can, therefore, readily agree with the declaration of eminent men and renowned thinkers from all over the world who gathe the U.N. headquarters a few years ago for a symposium on "Su in the Nuclear Age." They said: "The consequence of failure to c the arms race has been more confrontation and distrust, and th ority given to security issues has had unfortunate results not ju detente between East and West but also for North-South coope ...... Governments should plan and prepare for a process of trans resources from military to civil uses." It is time too, for, to quote Myrdal, "More and more States are buying more and more inse at a higher and higher price," and the pernicious paradox of the co people's craving in every country for peace and for basic nece coexisting with their government's craze for arms continues.

It is possible to rouse the conscience of governments and mo their "moral reserves" towards a consummation so devoutly wishe so consistently elusive? The examples of China, the USSR and offer a semblance of hope. The share of GNP used in China fo itary purposes has fallen perceptibly from 13% in the Sevent scarcely 7% in 1987, resources thus released being channeled for ities like reforestation, family planning and agricultural develop

On May 30 this year, the Soviet President, Mr. Mikhail Gorb announced an across-the-board cut of 14% in military expenditur year, earmarking the funds thus obtained for improving social tions. Japan has risen to be a formidable economic power witho commensurate military build-up. The superpowers are moving ily towards arms reduction and they could extend the principle to ing arms exports as well.

In a world that spends more than $600 billion per year on and navies, half the planets people suffer from malnutrition or o starvation. There are some people who are talking of placing w on space at further fabulous cost. Will the emerging century bring to the rich and not so rich nations?

— T.P.S. R.

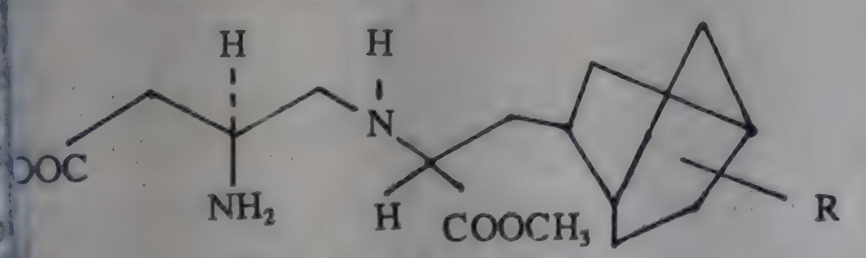
CHEMARENA

L. VENKITESWARAN

New Sweet or Salty Peptides

Sugar is sweet and salt is salty and both are relished in ›ds but both have unpleasant side effects. Sugar can lead ıyperglycemia or excess calories while salt contributes to ›ertension. Hence the search for alternatives which can vide the flavours and dietetic foods. Though no perfect stitute has emerged today Aspartame under the trade name rasweet is the preferred non-calorie sweetener. Aspartame ng a peptide from amino acids the search is intense on er peptides which could foot the bill on sweetness, safety, cost, high intensity and palatability. And also on similar npounds which impart a salty taste. The recent Pacific m 89 Conference in Honolulu had a session on flavour tides -- reported in *CE News* of 9th January.

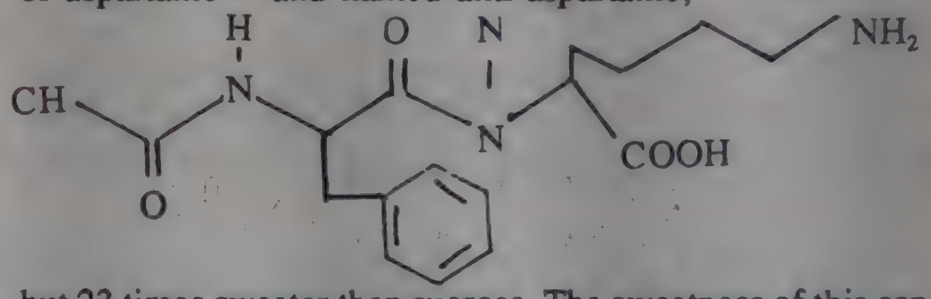
spartame is N-l-alpha-aspartyl-l-phenylalanyl-1-methyl r, 180 times as sweet as sucrose but not quite stable in tion, being a methyl ester. Hence the focus is on struc- l alternatives to get at better products if possible. Chem- at Coca Cola Corporation, the largest consumer of asweet, have attempted modifying the structure -- replac- he aromatic ring of phenyl alanine with a bicyclic alkyl such as the norboryl ring. Most are sweeter than aspar- with one 2000 times as much --



(Trimethyl derivative)

e are various ring isomers in this complex norboryl structure and only two have high sweetness.

Scientists of Kanegafuchi Chemicals, Japan have worked on the other end of stabiity of aspartame as it is easily converted into the tasteless cyclic form in solution. They have studied glycyl-lysine and find it has the same sweetness as sucrose. Aspartame's sweetness is said to be due to the trifunctional AH-B-X where AH is an acidic proton, B is an electronegative atom and X a hydrophobic group. In the peptide with lysine the AB-H-X triangle is the reverse of that of aspartame -- and named anti-aspartame,



but 23 times sweeter than sucrose. The sweetness of this can be increased by adding a hydrophobic group at the N terminal of glycyl-lysine -- say N-acetyl. None of these are methyl esters and perhaps could be synthesized at lower cost per unit weight though not per unit sweetness.

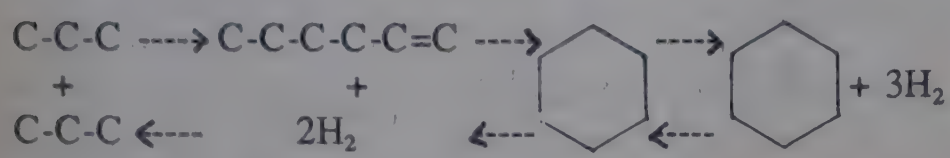
Scientists at Hiroshima University describe other peptides which impart a salty taste. Our average salt intake of 12gm/day, if cut by half could be helpful as the salty taste of these do not depend on HCl -- ornithyl beta-alanine as example. But this is a very costly way to cut down on salt intake. A number of simpler amino acids and their methyl esters could enhance saltiness of sodium chloride. Presently there are no takers for such compounds for saltiness but the work on sweetener peptides can lead to better products soon.

Aromatics from LPG -- Cyclar Process

e efforts to convert propane and butanes to aromatics area of great promise and the Cyclar process of UOP eferred to earlier. A detailed paper on this is published in *Hydrocarbon Processing* of Sept. 1989. The Cyclar process is based on a catalyst formulation of BP using UOP's CCR catalyst regeneration technology to get aromatics (BTX)

in a single step from propane/butane. A commercial scale plant is expected at Grangemouth in UK.

The major reactions are paraffin dehydrogenation followed by oligomerisation and cyclisation as per example:



The basic flow sheet is in figure -- and consists of a reactor, CCR unit and product recovery sections. Hydrogen is a major coproduct. While aromatisation is exothermic, the other stages are endothermic and so adiabatic conversion systems work well. Catalyst acquires a deposit of coke and needs regeneration cycles. The UOP reactor design for regeneration is used extensively. The product recovery has compression and hydrogen separation besides light hydrocarbons for use as fuel and the aromatic product in the unconverted feed is recycled. A refrigerated scheme enables hydrocarbons of 95% mol. purity to be recovered.

Product yields on the Cyclar process are as given in Table - 1 alongside.

Benzene to toluene/xylene ratio is about 1:2 for propane and 1:2.5 for butanes. The aromatic mix is good for gasoline blending to enhance octane. Feeds with C5 can also be processed. There is every possibility for recovery of pure b zene, toluene and xylenes depending on the size of the p -- say 15,000 barrels per stream day.

Table - 1

	Yields wt% of fresh freed		
	Aromatics	Hydrogen	Fuel G
Propane (100%)	63.1	5.9	31.0
Butanes (100%)	65.9	5.2	28.9

The economic incentive for this process is quite g --more so when C3-C4 components are to be cut in the g oline to maintain reduced RVP as required now in USA. Ir could certainly look at this process for higher value prod from LPG or cracker gases. Economics have been evalu based on assumptions of

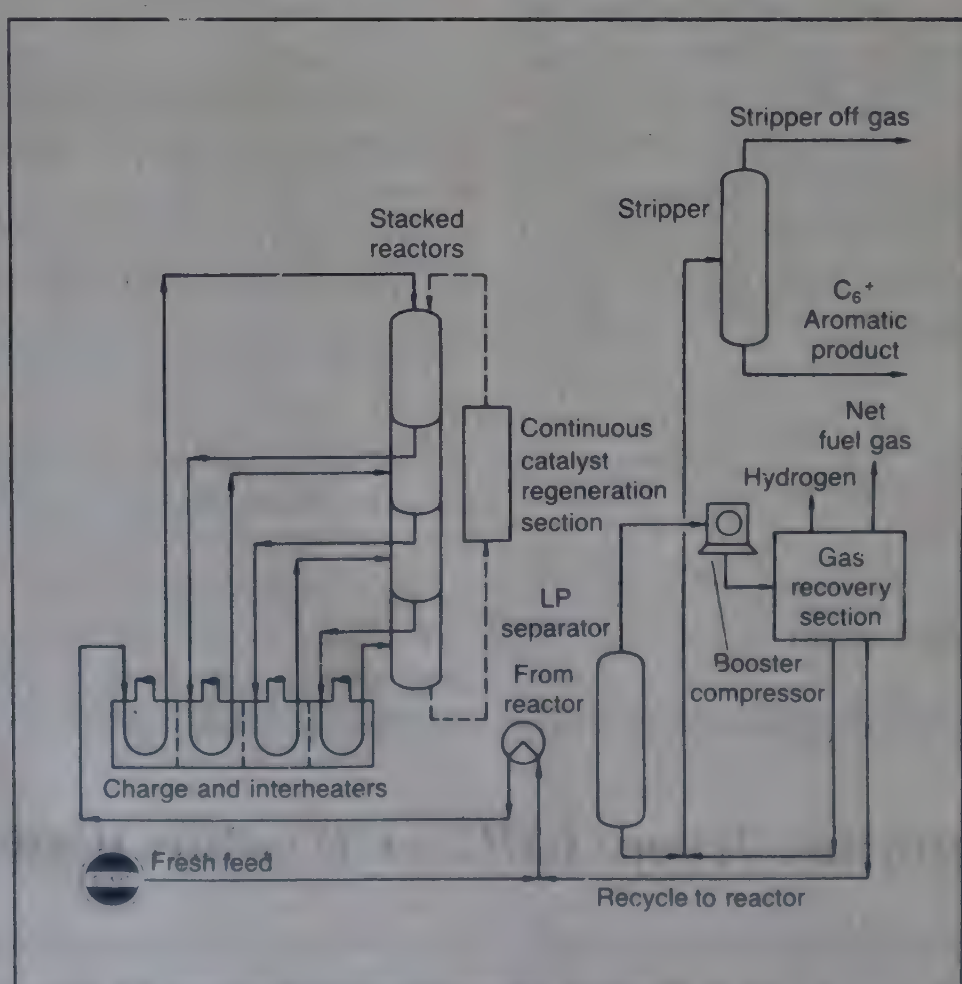
$110/ton for LPG.

$ 62 million for 15,000 bpsd

$ 120/t fuel gas

and $ 700/t hydrogen.

The economics depend on the value for hydrogen to a g extent. Cyclar aromatics can be sold for $250-300/t for in gasoline blend or at a lower price fc recovery of pure zene and toluene.



Duty cut on plastic inputs

The Government has reduced customs duty on certain important plastic raw materials with effect from February 28, an official press release said. As per the revised rates, the basic customs duty on polypropylene and copolymers of propylene stands reduced from Rs. 7,000 to Rs. 5,000 per tonne. On high density polyethylene moulding powder and granules, the duty will now be Rs. 3,000 instead of Rs. 6,400 per tonne. On low density polyethylene (LDPE) and their copolymers, other than LDPE-based sheathing compound and insulating compound, customs duty has been reduced from Rs. 6,200 to Rs. 3,000 per tonne.

On polystyrene, including copolymers of styrene, the duty has been brought down to Rs. 1,000 per tonne from Rs. 17,500 per tonne earlier. There is no change in the rate of auxiliary duty of customs leviable on these goods, the release added.

The government decision to cut the customs duty on these key polymers, barely three weeks before the Union Budget, is significant. This is because these levies had been raised only recently. This was resented by all sections of plastic users. Almost half of polymers demand in the country is met through imports. For instance, the customs duty on polypropylene and copolymers of propylene was raised from 20 per cent ad valorem to Rs. 7,000 per tonne. The duty on HDPE moulding powder and granules and LDPE and their copolymers was raised from 20 per cent ad valorem and Rs. 2,000 per tonne to Rs. 6,400 and Rs. 6,200 per tonne, respectively. As regards polystyrene, including copolymers of styrene, the duty was raised from 30 per cent ad valorem to Rs. 17,500 per tonne.

While the customs duty on all these items has now been reduced drastically, no cut has been announced for polyvinyl chloride (PVC) other than paste grade and battery grade. The duty on this item was raised in January from Rs. 1,000 to Rs. 2,000 per tonne. The auxiliary duty changes effected then have also been retained.

According to official sources, international prices of plastics have fluctuated widely during the last few months. For instance, LDPE prices have risen from around \$500-550 per tonne in 1987 to \$1,300-1,375 per tonne in March 1988. These prices came down to \$710 per tonne by October 1989, after which they started rising once again. This called for a duty reduction.

The demand for plastics in the country during the current financial year, is estimated at about seven lakh tonnes. Domestic production accounts for 3.4 lakh tonnes, while the rest of the demand for 3.6 lakh tonnes is met through imports.

Meanwhile, the plastics industry has hailed the government decision for quickly responding to their demand for customs duty reduction. There are over 2,000 small-scale plastics units in the country, which were dependent on imported polymer supplies at reasonable prices. The duty hike had made the landed price prohibitive and several of them had cut back their production. The industry is now hopeful that imports of polymers would start again, which had come to a stop after the duty hike.

CENTURY TEXTILES TO SET UP NITROCHLOROBENZENE PROJECT

The highly diversified B.K. Birla outfit, Century Textiles and Industries Ltd., is preparing itself to take up a Rs. 22-crore nitrochlorobenzene project in Haldia in Midnapore district. This will be the first unit in West Bengal of Century whose manufacturing facilities, which include textiles, rayon and tyre yarn, chemicals, salt, cement and pulp and paper, are dispersed in four states — Maharashtra, Gujarat, MP and

Apparently, the B.K. Birla group changed its earlier plan in terms which the group's relatively less kn outfit, Hindustan Heavy Chemicals, to be the partner of West Bengal In strial Development Corporation i joint sector project for an identical duct range, though of capacities than that now envisaged, in the s place, that is, Haldia.

According to Mr. K.K. Khemk very senior executive of the B.K. I group, the management after evalu the earlier proposal felt it woul worthwhile to have it entirely a inhouse venture and that financ strong Century was ideally place take it up. It would be funded very stantially from Century's int resources. The company expec receive a letter of intent soon.

The principle products are to be nitrochlorobenzene and ortho nit lorobenzene. The capacities envis are 3,300 tonnes for the forme 1,700 tonnes for the latter. In add there will be one intermediate pr and a few by-products.

The main raw materials will be c ine and benzene. The chlorine re ments are to be met by Hind Heavy Chemicals, which has its ity at Khardah in West Bengal. Fo zene, Century is to tie up with o the integrated steel plants of Authority of India Ltd.

For the earlier joint sector proje group had tied up for technical c oration with Biazzi of Switzerlar ATT (Dr Stage) and Plinke of Germany. The group is now takin to have collaboration agreements idated. The Swiss firm will be re ible for nitration, pollution contr overall coordination for foreign nology deployment, ATT for cr sation facility and Plinke for sul acid concentration.

O.P. KHARBANDA

FRANKLY SPEAKING

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Team Work Starts With Managers!

Managers are always preaching to their workforce to inculcate team spirit, but this is an area where 'charity' must indeed 'begin at home'. to make teamwork really succeed, managers first need to reform themselves before they can reform their workforce. This is the crux of the message by a doctoral research fellow, Lowell Turner ('Three Plants, Three Futures' Technology Review Jan. '89 38-45. Edited at the Massachussets Institute of Technology), a former union representative for the National Association of Letter Carriers. For this doctoral work at the Social Science Research Council and the Max-Planck-Institute in Cologne, West Germany. Lowell is comparing changes in work organisation and industrial relations in the U.S. and German auto and telecommunication industries. The present work seems to have prepared the author well for his more detailed and intensive research. Very briefly and candidly, managers need to change their entire attitude to workers before they can preach them teamwork and cooperation. This is illustrated by three case studies in real life situations.

First one relates to the GM-Toyota joint venture, NUMMI (New United Motor Manufacturing Inc.), in Freemont, California — where Japanese levels of productivity and quality have been attained, thanks largely to their having successfully translated their 'team concept' into practice. By providing a unique system of work and rewards, management has been able to earn the loyalty of most employees as also of their local union leaders. But to achieve this, the m agers had first to be trained in the new ways of dealing their workforce, taking into account the more important independent role of the unions in America than in Japan. were so designed as to create conditions that far excee the expectation of quality of worklife.

The second example relates to GM's assembly plant in Nyus, California, where the NUMMI formula seems to failing mainly because managers instead of reforming th selves have been trying to force participation, thus crea strong opposition at the shop floor level. Perhaps the anese influence is missing?

The third example relates to GM as well, their Nu 1 plant in Lansing, Mish. Here, management and the union have together created a 'homegrown' version of reorganisation combining teamspirit with the features o ditional U.S. labour relations. This 'hybrid' may be the runner of a magic formula elsewhere in the U.S. auto ind and perhaps other industries as well. With pressure headquarters against farming out the production of cushions, Lansing employees devised a foolproof pla organise work more efficiently and providing as also t ing the few displaced people for the new assignments. is the lesson?

For effective teamwork, the management needs to lo itself before preaching to the workers. Management ca an ideal example for the workers by reforming itself To ensure teamwork, unions must be involved actively management needs to move away decisively from the au itarian traditions of the past. If management is willi change, unions will follow suit — for the benefit of In India, we need to take this lesson to heart.

Dr. Kharbanda, a Fellow of the Institution of Chemical Engineers, is a visiting professor and and author of repute. His recent title: SAFETY IN CHEMICAL INDUSTRY, (Heinemann, 1988). Forthcoming titles: (All with Mr. E.A. Stallworthy) WASTE MANAGEMENT — TOWARDS A SUSTAINABLE SOCIETY (Gower, 1989) & PROJECT TEAMS — THE HUMAN ELEMENT (Ntl. Computing Centre, 1990). Available from Vivek Enterprises, 5, S.K. Barodawalla Marg, Bombay 400 026.

. EXPLORATION

Common basin plan soon

he Chemicals and Petrochemicals' istry is working on an idea to link hore with onshore areas for oil and exploration by foreign companies.

he monopoly of Oil and Natural Gas nmission (ONGC) is likely to be ken with foreign companies given a based on common basin approach. Gangetic plains, onshore Gujarat southern areas in Andhra Pradesh Tamil Nadu are likely to be thrown n as the Ministry is keen on speed- up oil and gas finds.

he fourth round of talks could start r the appointments to Oil and Nat- Gas Commission and other related es are made. An approach paper is g prepared for Union Cabinet clear- which will also ensure easier entry ns. For the fourth round bidding, an companies with firm foreign col- ration are also likely to be called to over the patent discrimination nst Indian private sector units.

nder the last agreement with foreign ompanies, in the case of a post tax n of 20 per cent the Centre retained er cent, the contractor 90 per cent. n 20 to 25, the split is 20 and 80. oves up to 70 per cent for Govern- t for profits of 30 per cent and e. The Ministry is looking into the r earlier worked out under the Rajiv dhi Government and could take her two to three months to get set resh operations to start from the drilling season in October 1990.

NGC has been faring poorly with major gas or oil finds to back its s. It has been always against any gn company though it has now the help of British Petroleum to ate its seismic and drilling efforts e Gangetic basin. Bombay High ast till 2000 A.D., and that through us schemes like water injection h does not add to the potential.

A keen world class player interested in striking a deal is British Petroleum. It has had talks with various Indian groups including Tata (though they are silent on it) but has yet to firm up. Hindustan Oil Exploration Corporation (HOEC) set up by all the Indian big houses has been keen over the last one year but ONGC has thwarted every effort.

It has signed a memorandum with Oil India to take up jointly onshore exploration in the Gangetic basin but the Ministry did not okay the deal. It is still lying in the Ministry and Hindustan Oil Exploration Corporation is hopeful of a better deal. Even a company like Vam Organics of the Bharatias are talking with foreign oil companies to get into oil exploration. Essar proposes to set up a separate company to go in for oil search.

OIL PRODUCTION FROM NARIMANAM

The Oil and Natural Gas Commission has started producing oil from the well at Narimanam in Thanjavur district of Tamil Nadu, using the technique of "early production system". The well at Narimanam where hydrocarbons were struck on February 7, was yielding about 555 barrels of oil a day. Another well at Nannilam in Thanjavur, which yielded about 500 barrels of oil would also come under the early production system in a few days, according to ONGC sources. The hydrocarbons were struck in these two wells more or less simultaneously. The early production system is a method employed to quickly produce oil or gas from a well, without waiting for the characteristics of the reservoir to emerge or complete development of infrastructural facilities. This technique helps in quick recovery of the money spent in drilling the well.

Exports of dyes touch Rs. 402 crores

India's exports of dyes and intermediates shot up to Rs. 402 crores in 1988-89, from a mere Rs. 38 crores in 1984-85. This is revealed in a study on dyes and intermediates prepared by the Trade Development Authority. The study, however, says that despite this significant growth the country's share in world trade remains low. The study calls for fiscal incentives to the industry for increasing research and development outlay and absorption of imported technology and its continuous upgradation to enable India to remain in the forefront of international competition.

It suggests a comprehensive export promotion strategy and measures to be initiated by the Government and trade and industry for boosting exports. Besides desk research, the study includes intensive field surveys involving discussions with select manufacturers and exporters at important production centres.

Many dyestuff manufacturing units, it says, have outdated plant and machinery. Modernisation should be encouraged by lowering import duty. Latest technology, particularly for key intermediates and a new range of dyes should be liberalised which would help make Indian industry more competitive in the international markets. Reputed world manufacturers were keen to enter into technological collaboration with developing countries to avail of the benefit of cheap labour and to supplement their own production at low costs.

The study calls for simplification of imports under advance licence system as also under the pass book system. This should include and cover imports of raw materials, including packaging and packaging material. The study underlines the need for production of high quality 'sample catalogues' containing information on company products. To make Indian products more competitive in the international market, development of technology, reduction of the costs of raw materials and other inputs that help reduce the production costs have been recommended. It also calls for sponsoring of sales-cum-steady teams, participation in international fairs, integrated marketing programmes and warehousing facilities in overseas markets.

On the crucial question of pollution control, the study suggests establishment of common effluent plants for the small-scale sector. Small sector units, the study reveals, are mainly concentrated in industrialised zones in Gujarat and Maharashtra. Implementation of environmental protection programmes should be spread over a reasonable but definite period of time, the study adds.

Products of the chemical indu meet the essential needs of the comm man and as such their cost of prod tion should not rule high, the Ind Chemical Manufacturers Associat (ICMA) says. In a pre-budget mer randum to the Finance Minister, association said that "a major eff should be made to reduce project co in the chemical sector, particularly p rochemicals which are highly cap intensive".

Heavy import duty on capital goo (around 80 per cent) coupled with h interest rate even on project loans h made projects in this sector in In about 75 per cent costlier than l investments in many other countri The association has pleaded for red tion of import duty on capital goods 25 per cent of the c.i.f. value. It h underlined the need to introduce a t value-added tax system by means which all duties payable on finish products were levied at the final sta

The suggestions of the indus include-waiver of customs duty on p lution control and safety equipment a appliances along with a scheme for s loans for financing their purchase a installation and introduction of a schei for duty free import of capital goo with commitment to export produ three times the value of capital goo in a specific time-frame.

DCW plan to make titanium

DCW Ltd. is working on a long-term project to manufacture titanium sponge and metal. Titanium metal is not made in the country on a commercial scale. The Defence Research Development Organisation in Hyderabad is said to be producing very small quantities.

The metal has diverse strategic applications because of its peculiar characteristics. It is a lightweight metal which does not corrode and can withstand great stress and strain. It can replace graphite as an electrolyser and special coating made out of the material can improve conductivity. With its long experience in ilmenite beneficiation and with facilities close to the ore sites, the company feels it is well equipped to diversify into this virgin field.

DCW has now started marketing Titanox, a buff titanium dioxide (TiO_2) that can replace the costlier pigment grade titanium dioxide in a number of applications. Some major paint producers are experimenting with the product which is yet to discover its right place and usages in the paint industry.

On its part, the company has installed imported equipment to improve the product. "It is a good material for specific applications", said a paint industry source. "It has received a good response. DCW is in fact rationing supplies".

Titanox is being sold at Rs. 58 a kg. compared to Rs. 75 a kg. for indigenous pigment grade titanium dioxide. Global price has tumbled from US $27,000 to US $25,000 and is likely to soften further. Landed price comes to about Rs. 94 a kg.

Though new in India, buff TiO_2 has for long been in use in United States. DCW has been exporting the material to an American firm which, after effecting improvements, is marketing it to US paint manufacturers.

Expansion of the synthetic rutile plant is one of the several projects for which the company has drawn up a modernisation programme costing almost Rs. 100 crores. This is aimed at revamping the soda ash plant at Dhrangadhra in Gujarat and the caustic soda works at Sahupuram in Tamil Nadu. The synthetic rutile plant has 20,000 tonne capacity, but production had dwindled to 12,000 tonnes.

The synthetic rutile plant was set up in 1969 as a chlorine utilisation project. It was a totally indigenous effort based on in-house design and engineering. It is the only plant of its kind using hydrochloric acid for ilmenite beneficiation.

The company had to overcome competition from natural rutile. Considerable research and marketing effort preceded the product's acceptance in foreign markets. It has been exporting about 10,000 tonnes a year, earning more than US $6 million. Eight years of R & D work preceeded the launch of buff TiO_2.

NATIONAL CO-ORDINATION OF TESTING AND CALIBRATING FACILITIES

Government of India, Department of Science and Technology, invite applications from testing and calibration laboratories for their accreditation under the programme on National Coordination of Testing and Calibration Facilities (NCTCF). Organisations (Government or private) which undertake testing/calibration either for their own purpose or for others are eligible to seek accredition.

For details please write to: Testing Laboratories, Adviser, Engineering and Technology, Department of Science & Technology, New Mehrauli Road, New Delhi 110 016. (or) Calibration Laboratories, Director, National Physical Laboratory, Dr. K.S. Krishnan R New Delhi 110 012.

TECHNOLOGY INFORMATI SERVICE SET UP

The Technology Development Information Company of India Lim a venture capital company promote UTI and ICICI have set up a Tech ogy Information Service (TIS) to vide information on different area science and technology ranging f biotechnology to computer.

With access to close to 340 inte tional databases, the service can pro in the form of a report; result of s searches as the customer desires. C of such a service is expected to be sonable, with a preliminary search about 10 minutes costing only ab Rs. 1,000. This comprises the cost database access and P and T telec charges as well.

An advance charge of Rs. 500 is p able for a preliminary search. Once preliminary search report is sent, fur information can be sought on selec items. The upper limit of cost can a be specified by the client to prevent over-runs.

The information service is expec to be useful for:

* Exploring investment opportunit
* Choice of technology/collaborat
* Alternate processes to improve ma facturing operation
* Review state-of-the-art in a tech logy area
* New products for specific applicati

Further information can be had fr Technology Information Service, Te nology Development and Informat Company of India Limited, Leo Co plex, 6th Floor, 44 & 45 Reside (Cross) Road, Bangalore 560 0 Telephone: 574581/574582/5745 579681. Telex: 0845-2947 TDIC Fax: 0812-564741. Grams: TECHD

L RESERVES

,argest off-shore gas field to be tapped

The country's largest off-shore gas ld, south Bassein, is being tapped for arge reserve of oil and already the st well in this field "BA-1" has been t on experimental production, the Oil d Natural Gas Commission (ONGC) ted at Bombay. The giant south Bassein field, located about 80 kms. rth-west of Bombay in western offore, was discovered in March 1976, l has been developed for meeting the requirements of various power, ferser and petrochemical plants enroute HBJ pipeline.

An ONGC release said the field had ained special significance due to the sence of a thin oil rim with estimated erves of 112 million tonnes, sandhed between a gas layer and bottom ter layers. "If this oil is not recovd by suitable technology, it is likely t the oil might migrate into the gas e and be lost forever", according to technologists.

However, the ONGC technological erts have noted that production of oil n this zone is a "challenging task". loration of oil is possible through of innovative techniques like hortal drilling and simultaneous protion of oil and gas with water ction. The experts explain that hortal drilling is the latest emerging d in drilling technology the world r improving recovery from the field helping to reach remote targets.

Horizontal drilling is considered ropriate for production from thin oil s. ONGC has gained experience by ing seven horizontal wells in westoffshore. Drilling of a horizontal is to be taken up during 1990-91 n one of the platforms of this field. Experimental platform is being put o try out the method of simultaneexploitation of oil and gas with r injection. There are plans to lop the relevant zone of the Bassein for oil and gas production through tional platforms spread all over the le field.

It is planned to try out in this well another innovative technique designed by the ONGC's institute of reservoir studies, Ahmedabad, which has not been tried anywhere in the world, and consists of creating an impermeable viscous bowl around the well bore to isolate the oil. The south Bassein field is a prolific gas producer. Its geological reserves are estimated to be 395 million tonnes of oil and oil equivalent of gas. Plans have been made to utilise the gas at the rate of 20 million cubic metres per day for more than 20 years. At present, the field is producing about 12-13 million cubic metres per day for supply to three fertiliser projects and two gas-based power plants enroute the HBJ pipeline.

The gas is routed to the Hazira onshore terminal through a 234 kms long 36 inches diameter pipeline. The line with a handling capacity of 20 million cubic metres per day has been built to meet the stringent requirements of sour gas transportation. The pipeline is India's longest sub-sea pipeline and is one of the heaviest and the largest diameter pipeline in the world, the release added.

PRIORITY FOR INDIGENOUS GAS RESOURCES

The Union Government will lay adequate stress on the use of indigenously available gas resources during the Eighth Plan and petrochemical projects will be selected on the basis of their ability to reduce imports, Mr. M.S. Gill, Secretary of the Department of Chemicals and Petrochemicals, said at New Delhi recently. The petrochemical industry being highly capital intensive as also energy intensive, has led the authorities to examine the requirements of this sector in greater detail, he said. Mr. Gill was inaugurating a two-day Indo-Japanese seminar on "Energy Conservation in Petroleum and Petrochemical Sectors" at New Delhi.

Kribhco stakes claim for new gas-based project

Krishak Bharati Co-operative Limited (Kribhco) has staked it's claim for a new gas-based fertiliser plant to be set up during the Eighth Plan period. The Union government is examining its proposal. In the meanwhile, it has asked Kribhco to find out if adequate gas will be available for the proposed plant.

Official sources at New Delhi say that Kribhco has already approached the Gas Authority of India Limited (GAIL) to obtain its commitment for adequate gas supply to the proposed plant. Talks between the two organisations are now on. The proposed plant is to be set up at Palwal in Haryana. The site of the plant will border three states — Haryana, Punjab and Uttar Pradesh. Thus, the plant will enjoy the locational advantage of catering to the fertilisers demand of these states.

The plant is proposed to be set up with a capacity of 1,350 tonnes per day (TPD) of ammonia and 2,200 TPD of urea. The estimated cost for setting up the plant is Rs. 800 crores. According to preliminary estimates, an ammonia-urea plant of this capacity would require 1.8 million cubic metres of gas per day. Kribhco sources say that availability of gas should not pose a problem.

Various tap-off points can be created in the existing Hazira-Bijaipur-Jagdishpur (HBJ) gas pipeline for supply of gas to the proposed fertiliser plant at Palwal. Recent discussions between Kribhco and GAIL (which supplies gas through the HBJ pipeline), are meant for exploring such possibilities.

The Palwal plant will be around half the present capacity of Kribhco's only ammonia-urea project at Hazira. But it will have the same capacity as those of new gas-based plants at Aonla of IFFCO and at Guna of National Fertilisers Limited.

Kribhco will start work on the detailed feasibility report only after it gets the government's approval in principle. Subsequently, the project has to go through the usual channels of public investment boards and the Cabinet. Secondly, the proposal is in line with the government's policy approach for setting up new fertiliser plants during the Eighth Plan. It has been agreed to have the new plants for the Eighth Plan period in either the public or co-operative sector. It was only in the Seventh Plan that the Rajiv Gandhi government had awarded a few projects to private sector parties.

The experience of delayed implementation of all these private sector projects and the new government's preference for the public and co-operative sectors might mean that Kribhco may finally bag a new project, after its unsuccessful attempts for about a decade.

Despite Kribhco's creditable performance (capacity utilisation of 93.5 per cent for the ammonia plant and 97.4 per cent for the urea plant in the first year of production was a world record), the government is yet to entrust it with the responsibility of setting up another fertiliser plant. It's strong bid for the Shahjahanpur project failed with the entry of Bindal Agro of Mr. Abhay Oswal, who bagged the project just prior to the general election in November 1989.

During the last year, Kribhco's Hazira plant operated at a capacity utilisation level of 115-118 per cent.

GAIL TO HANDLE BULK TRANSPORT OF NATURAL GAS

The Gas Authority of India Limited (GAIL) is to be allowed to undertake bulk transportation of natural gas in the country. This would involve taking over some of the activities of Oil and Natural Gas Commission (ONGC) GAIL which has so far only been tr porting the gas through the HBJ pipeline.

A three-member committee is being set up with representative ONGC, GAIL and Petroleum Mini to go into the issues involving transportation of gas, including tran of assets from ONGC to GAIL. T assets will have to be identified a price fixed for them. The Petrol Ministry has already made some visional assets to ONGC.

However, the decision to allow G to undertake marketing of LPG has reserved. Last year, the Ministry decided in principle to allow GAI market LPG. The Oil and Co-ordina Committee (OCC) was asked to cate a share of the LPG market to G. OCC decided to allow GAIL to ma LPG for commercial purposes w would have made GAIL the fo company for marketing LPG in country. In the first place, GAIL w distribute LPG in Gujarat, Madhya desh, Rajasthan, Uttar Pradesh, Pu Haryana, Delhi, Chandigarh Bombay.

GAIL recently advertised in new pers inviting offers from manufactu and suppliers of bottling plants, cylinders, valves, regulators and, ers and truck transporters. Transfo functions and assets from ONG GAIL has been a matter of controv for quite some time now. GAIL been claiming that processing, trans tation and distribution of natural g its function as per its charter. Petroleum Ministry had in Febr 1988 issued orders to transfer responsibility concerning proces transportation and marketing of gas associated assets and liabilities to G in Krishna, Godavari and Ca basins, Tripura, Western onshore r excluding Hazira Gas Processing C plex and the Compressed Natural Project.

Rs. 250 crore OIL project for gas production

Oil India Limited (OIL) has proposed a Rs. 250-crore project to produce free gas at a plateau production rate of 2.85 million cubic metres per day. The gas is to be utilised for generation of power and industrial purposes.

The project envisages drilling of 44 wells for proper delineation and development of the major gas reservoirs to sustain production at the rate of 2.85 million cubic metres for a period of 15 years. Of these, 30 wells will be required during the initial phase of drilling. Remaining 14 wells will be required to be drilled for optimum drainage of the complex faulted reservoirs and for maintaining the overall production rate.

The capital cost of the project equipment and facilities has been estimated at about Rs. 137 crores with a foreign exchange component of about Rs. 44 crores. In addition, the outlay for drilling 30 wells and work over for recompletion of four existing wells as gas producers is estimated at Rs. 113 crores with a foreign exchange component of Rs. 66 crores.

A "wet" gas system will link the free gas fields of Tangakhat, Deohal and Nahorkatiya main with Duliajan. A "dry" gas system will link the free gas fields of Kathalguri and Madhuting-Tipling with Duliajan. The wet gas from the Tengakhat field will be transported to Duliajan through a 12-inch pipeline.

There will be two spurlines connected to the 12-inch pipeline for transporting the gas produced from Nahorkatiya main and Deohal fields to Duliajan. The dry gas from Kathalguri will be transported to Duliajan through an eight-inch pipeline. There will be one spurline connected to this line for transporting gas from the Madhuting Tepling area to Duliajan. The central gathering station and offtake point will be at Duliajan.

USE OF GAS FOR POWER: STUDY ON

The Union Ministries of Petroleum and Energy are working together to prepare a paper on the effective utilisation of gas for power generation. The Union Petroleum and Chemicals Minister, Mr. M.S. Gurupadasamy, told newspersons at Bangalore recently that exercises had already been initiated in this regard and that the paper would be ready in a few weeks for inclusion in the Eighth Plan, provided all were obtained in time. The proposal was placed before the Planning Commission and it would subsequently have to be cleared by the Public Investment Board and the state cabinet.

The first stage of the proposed refinery was expected to cost about Rs. 1,000 crores. The minister, however, declined to comment when asked whether a refinery or petrochemical complex would come up at Mangalore. Mr. Gurupadaswamy noted that supply of liquid petroleum gas (LPG) was confined to towns with a population of 20,000 or more since demand was in excess. However, other petroleum products were available in adequate quantities and the Centre was prepared to supply more kerosene to whichever state needed it.

He urged the state governments to reserve some land in cities and towns for siting distribution outlets for LPG, kerosene and petrol. There were, he estimated, over 4,000 distribution outlets for the country's four petroleum marketing companies.

To streamline the procedures for appointment of new dealerships and distributorships and to reduce the commissioning time from three years to one year, it had now been decided to set up six Oil Selection Boards, each of which would be chaired by a retired high court judge and have a retired civil serv and a prominent member of the pu as members.

RCF AWARD TO MAHARASH TRA DRUG CHEM

M/s. Maharashtra Drug Ch (112/114, Bhandari Street & 153/1 Sheriff Devji Street, Chakla, Bom 400 003.) won the prestigious Rasht Chemicals & Fertilisers Ltd. Award the year 1989 for outstanding perfor ance in developing and promot market for RCF industrial products p ticularly methanol, ammonium bicar nate and ethylamines etc. with their f of tankers. The award was presented 26th January 1990 by the C & MD RCF Mr. S. Venkatesan to Mr. Kapadia of Maharashtra Drug Che

00 World biotechnology companies plus upport firms detailed in new industry directory

xtensively updated 300-page 0-91 Directory gives Addresses, ne/Telex, Contact(s), Projects/Pro-ts and Brief Financials for 1000 rld Biotech Companies; Data on eral hundred support firms also luded. Is available in package with ekly News/Updating Service.

ort Angeles, Wash., 7 Jan. 1990 — Engineering News is releasing the 0-91 edition of its annual Bio 1000) directory (ISBN 0-936451-04-1). in past years, the extensively updated ctory includes the latest information he world's leading 1000 biotechnol- companies. In 300 typeset pages, new Bio 1000 lists addresses, tele-ne/telex/Fax numbers, founding s, contact(s), projects/products and f financial data, including key inves- and joint-venture partners in many s. A supplemental section contains ils of several hundred support firms.

ctivities of the companies covered de human and veterinary therapeu- and diagnostics, waste recovery, l/mineral extraction, enzymes, vit-ns, fine and specialty chemicals, culture, forensics, animal breeding, ics, adhesives and other areas. nologies employed at these com-es include recombinant DNA, cell re, hybridomas and monoclonal odies, cell fusion, mutagenesis, t tissue culture, embryo transfer, and peptide synthesis, fermenta- and novel bioseparation and pur-ion technologies.

ch company listed in the Bio 1000 a unique number which is cross enced whenever the company is ioned in Bio Engineering News, eekly biotechnology news service. is way, the directory is kept con-ly up to date. Both the directory 2 issues of Bio Engineering News vailable as a special package at a combination price of $495.00. (U.S. Funds/Bank). The directory package also includes 10 issues of World Bio Licensing & Patent Report (TM) a summary of biotechnology licensing opportunities and U.S. and foreign patent data. A free set of all back issues from 1980 through 1989 is supplied to new subscribers whose subscription is accompanied by payment.

To subscribe or for further information on the 1990-1991 Bio 1000 and the package subscription rate, please contact: Bio Engineering News, P.O. Box 1210, Port Angeles, WA 98362-0224, USA. Tel.: (206) 928-3176. Fax: (206) 928-3087. Telex (WUI): 6975969.

120 ENZYME RELATED FIRMS DETAILED IN UPDATED POCKET GUIDE

A monthly newsletter serving the enzyme industry, announces publication of the "1990-1991 Enzyme Firm Pocket Guide" (ISBN 0-936451-05-X). In 40 typeset pages, the new guide provides information on 120 enzyme-related firms in the U.S., Canada, South America, Europe and Japan. Data provided includes address, phone/telex/fax numbers, contact person, and general product information.

Firms covered produce enzymes used in medicine, diagnostics, wine and cheese making, detergents, food and juice production, HFCS, genetic research, fuel alcohol, speciality chemicals and other sectors. The directory is available free of charge with a new subscription to DJM Enzyme Report, an English language monthly newsletter published since 1982. Price of a subscription is $195.00 (U.S. funds/Bank). As an additional bonus, those sending in paid orders will receive all 1982-1989 back issues of DJM Enzyme Reports on microfiche.

To place orders or for additional information, please contact: DJM Enzymes Report, P.O. Box 1210, Port Angeles, Wash. 98362-0224. Tel.: (206) 928-3176, 24-Hr. Fax: (206) 928-3027, Telex: (WUI) 6975969.

MOVE TO AMEND WATER CESS ACT

A proposal has been mooted to amend the Water (prevention and control of pollution) Cess Act, 1977 to remove certain lacunae in it and to ensure more resources for the pollution control boards. The proposal has been mooted by the conference of officers of states and union territories and Central government on environmental pollution, which concluded at New Delhi, recently.

The conference concluded that the pollution control boards and the factory inspectorates should immediately identify the hazardous chemical units in their states and ensure that they take the necessary safety steps. The boards will also make each of these hazardous units prepare an onsite emergency plan in case of accidents.

The district collectors will be helped in preparing off-site emergency plans. It has agreed that the department of power will set up a group to examine the technologies available and make it mandatory for the thermal stations to dispose of the flyash in a productive way.

GAS TURBINE STATION IN TN

A 90 mw gas turbine power station based on natural gas is proposed to be set up by September 1993 at Vettangudi near Thirumullaivasal in Sirkazhi taluk of Thanjavur district by the State government. This station, estimated to cost Rs. 126 crores will generate 552 million units of power annually and will be known as Thirumullaivasal gas turbine station.

Environment court planned

To deal with complaints of environmental excesses, the Government proposes to set up a special court with the powers of a high court, the Union Minister of State for Environment and Forests, Ms. Maneka Gandhi, said on February 25.

Speaking to reporters at Baroda, Ms. Gandhi said the framework of the draft legislation for setting up an environment court is being formulated and will be introduced in the next session of the Lok Sabha. Legal luminaries are involved in framing the draft legislation, she said.

The court will help make environment 'a people's issue' since it will take the onus of initiating action from the Government to the common man affected by environmental degeneration and will remain the final court of appeal, she added.

Checks to ensure that situations do not arise where the court becomes overburdened with cases and a backlog develops have also been visualised, she said adding that this court would initially become functional in Delhi.

The Minister said that it was proposed to introduce a uniform forest policy for the entire country. She said this would enable effective enforcement in a situation like in Tamil Nadu where sandalwood was cut against the law but disposed of in neighbouring Andhra Pradesh.

Ms. Gandhi also said that pollution boards would become more vigilant. She said that the Narmada project had not been referred to the Environment Ministry yet.

Preparation of impact assessment reports before initiating projects like the Narmada and the Tehri will bec
mandatory as part of a 'scientific e
ronment policy', she added.

FACT CAPROLACTAM PLAN
TO GO ON STREAM BY JUN

A Rs. 350-crore project to pro
caprolactam with by-product of amn
ium sulphate at the Cochin plant of
tilisers and Chemicals Travan
(FACT) is likely to go on strea
June or July this year, Mr. M.B. C
dran, chairman and managing dire
has said.

He told newsmen at Tiruchara
that the expansion project would
duce 50,000 tonnes of caprolactam
over two lakh tonnes of ammonium
phate per annum. Another projec
produce 900 tonnes of ammonia
being prepared and is likely to get
shape during the Eighth Plan, the c
man added.

d to plug loopholes in pollution control laws

ne standards for emission from ol and diesel-driven vehicles noti- under the amended Motor Vehicles will be strictly enforced from March is year.

his follows the recommendations of pollution control conference which cluded at New Delhi on February after two days of indepth deliber- ns on the ways to control the major es of pollution in the country.

he conference was attended by off- of the pollution control boards and ronment and transport departments e States and Union Territories and Union Government.

long with enforcement of the stan- s, the State transport authorities and ollution control boards will launch npaign on awareness and training. rever possible, the petrol stations other testing centres will be encou- to instal the necessary equipment at certificates can be issued to vehi- conforming to the standards. In ion, the authorities will acquire suf- nt number of testing instruments for e-spot checks of vehicles on the

e other recommendations pertain to the production disposal of flyash from the thermal power stations, check on pollution by industries such as pulp and paper, distilleries, sugar units and tanneries, management of hazardous chemicals and precautions on their transportation, pollution of water and air by the use of heavy pesticides and pollution of industries at the river banks.

In most of these cases, the pollution control laws and rules have been notified by the respective authorities but what has been lacking is the implementation. The conference has resulted in a sense of urgency that these matters should be looked into urgently and the loopholes plugged.

To check the problem of flyash, the Department of Power has decided to set up a group to examine the technologies available and it would be made mandatory for the thermal power units to dispose of the flyash in a productive way.

The State pollution control boards have also decided to intensify the campaign for observance of standards in respect of the distilleries, sugar units, pulp and paper units and tanneries.

As for the hazardous chemicals, the boards and factory inspectorates will take immediate steps to identify the hazardous units in the States and ensure that these units adhere to the safety measures. The States have also agreed to take quick action in ensuring that the generators of hazardous wastes have adequate management plans for these polluting items.

The States will also monitor the pollution of water and air from the effects of heavy pesticides and prepare status reports. The Ministry of Agriculture will initiate a programme of monitoring of the pesticide residues in the environment and consider the desirability of banning or restricting the use of some of the more harmful pesticides. In fact, some of these pesticides have already been banned in foreign countries.

Regarding industries on the banks of the rivers, the pollution control boards will identify the units and ensure that all effluents are treated before discharge into the rivers or water bodies.

The polluting industries which fail to take adequate steps may have to pay cess at a penal rate. For this purpose, it was decided to amend the Water (prevention and control of pollution) Cess Act to remove certain lacunae and ensure more resources for the authorities.

Aquatic plant that absorbs effluents

A small aquatic plant is being used to purify industrial effluents. The plant, a member of the Lemna family, is so tiny that its leaves are no bigger than a thumb nail. Yet, it can reduce the level of nitrogen to less than 1mg per litre, ortho-phosphate to less than 0.1mg/l, and total phosphorous to less than 0.3mg/l.

Lemna, which can be found in most parts of the world, grows and reproduces very rapidly; a colony of this plant may double its weight in less than 18 hours by absorbing effluents in water and converting them to potentially valuable protein.

It is currently being used by GAT, a fruit and vegetable processing factory in Israel that has found traditional treatment system too expensive to operate and maintain.

The investment required for a Lemna waste water treatment facility, on the other hand, is very small. Existing ponds can be retrofitted with porous hydraulic baffles and floating Lemna barriers to channel the flow and control plant proliferation. Apart from the low in investment, some or all of the cos upkeep and current operation car covered by harvesting the ma Lemna and using it as livestock foo The plant has a protein content of m than 35 per cent and a very large acre yield.

The technology of using Lemna purifier was originally developed ir US. It was brought to Israel by I mark, a marketing company with a iations to Technitran Internationa Minneapolis, an experienced technol transfer organisation.

FORM IV
(See Rule 8)
Statement about ownership and other particulars, about newspaper CHEMICAL WEEKLY

	MADRAS	BOMBAY
1. Place of Publication:	MADRAS	BOMBAY
2. Periodicity of its publication:	WEEKLY	WEEKLY
3. Printer's Name:	N.R. RAJAGOPALAN	R. RAGHAVAN
Nationality:	Indian	Indian
Address:	47, 3rd Street, East Abhiramapuram, Mylapore, Madras 600 004.	7, Prabhat View, L.N. Road, Dadar, (C. Rly.), Bombay 400 014.
4. Publisher's Name:	N.R. RAJAGOPALAN	R. RAGHAVAN
Nationality:	Indian	Indian
Address:	47, 3rd Street, East Abhiramapuram, Mylapore, Madras 600 004.	7, Prabhat View, L.N. Road, Dadar, (C. Rly.), Bombay 400 014.
5. Editor's Name:	R. RAGHAVAN	R. RAGHAVAN
Nationality:	Indian	Indian
Address:	7, Prabhat View, L.N. Road, Dadar, (C. Rly.), Bombay 400 014.	7, Prabhat View, L.N. Road, Dadar, (C. Rly.), Bombay 400 014.
6. Names and addresses of individuals who own the newspaper or shareholders holding more than one per cent of the total capital:	1. N.R. RAJAGOPALAN 47, 3rd Street, East Abhiramapuram, Mylapore, Madras 600 004. 2. R. RAGHAVAN 7, Prabhat View, L.N. Road, Dadar, (C. Rly.), Bombay 400 014. 3. VIJAY RAGHAVAN 7, Prabhat View, L.N. Road, Dadar, (C. Rly.), Bombay 400 014.	4. RAJALAKSHMI RAGHAVAN 7, Prabhat View, L.N. Road, Dadar (C. Rly.), Bombay 400 014. 5. R. SARANGAN B-21, Guruprasad, Opp. Tata Colony, Chunabhatti, Bombay 400 022.

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I, R. Raghavan, hereby declare that the particulars given above are true to the best of my knowledge and belief.
Date: 1.3.90 **Signature of Publisher:** R. RAGHAVAN

AR, DISTILLERY, PAPER AND ALLIED INDUSTRIES

T organises symposium on treatment options

e Centre for Environmental ice and Engineering, Indian Insti- f Technology, Bombay, organised -day State of the Art Symposium eatment Options — Sugar, Distil- Paper and Allied Wastewaters on mber 7-8, 1989 at IIT Campus. ey-note address was delivered by S.I. Jambunathan, Secretary- rtment of Agriculture and Coop- n, Govt. of Maharashtra and Prof. ag, Director welcomed the dele- Prof. H. Veeramani, Symposium man, gave an overview of the osium while Prof. C. Natarajan ghted CESE activities. Dr. P.M. k gave the vote of thanks, The osium attended by 150 delegates o-sponsored by Industrial Devel- nt Bank of India, The Industrial t & Investment Corporation of Ltd., Netel Chromatographs, Poly- Limited, Process Plant Engineer- PB-Projects & Consultancy Ltd., Vestern India Paques Limited.

-NOTE ADDRESS: By Shri S.I. unathan, Secretary, Depart- of Agriculture and Co-opera- Government of Maharashtra.

deem it an honour to have been d to deliver the key note address ay's Symposium. I am very happy n your midst and look forward to and expert discussions from all

ill not be out of place if I take this tunity of giving you a bird's eye- f the status, achievements and the ms of the sugar industry as a in the country. This is because iscussion on a sectoral problem pollution control will become tical, if it is not conceived as part macro problem, so that any solu- r suggestions that emerge from ymposium can form part of the overall strategy for the development of the sugar industry as a whole, especially in the context of the Eighth Five Year Plan, under finalisation now.

India is the largest producer of sugarcane as well as sugar in the world and the sugar industry is the second largest agro-based industry in India, next only to Cotton Textile industry. All these factories are in the rural areas and, apart from giving direct employment to 3.25 lakh workers, work as catalytic agents for area development.

World sugar production is expected to increase from 109 million tonnes in 1990 to 133 million tonnes in 2000 — while consumption is expected to increase 1.7 per cent annually. The production in India is 11.3 million tonnes in 89-90 and expected to reach a figure of 13.55 million tonnes in 94-95. Maharashtra, which accounts for 35% of the sugar production in the country has got 101 sugar factories, 26 distilleries, 3 under erection, 5 paper plants and 5 chemical plants.

Government of India has declared a new sugar policy under which the minimum capacity for a viable new unit is 2500 TCD, at an estimated cost of Rs. 22 to 25 crores, with priority for the cooperative sector. Adequate emphasis is laid for sugarcane development with ample provision for funds for this item under the Sugarcane Development Fund Scheme.

Along with success, there is a growing problem of sickness in the sugar industry, for which an ambitious programme of modernisation, diversification and rehabilitation of sick units is contemplated. Regarding diversification, it is a general view that it should be encouraged if it would help in making the units more viable, especially units based on bagasse and molasses like paper units, particle board, distilleries, co-generation of electricity etc.

One of the main by-products of the sugar industry is bagasse mainly used as fuel in the boilers and as a raw material for cellulose industry, power generation etc. The annual production from 1000 boilers in the country is 25 metric tonnes per year. The air pollution caused by the use of bagasse in boilers due to fly ash is considerable and poses serious hazards. As regards molasses, nobody can deny the paramount need for proper storage as per the prescribed control orders. The problem becomes more acute because of the slow lifting of the distilleries, leading to accumulation and need for building extra capacity. While burning of bagasse leads to air pollution, molasses is the main culprit for water pollution. This is very tragic, keeping in view the fact that the limited water resources in the rural area being utilised for sugarcane cultivation and, if they are polluted, there will be a serious drinking water problem and general health hazards for the villagers using these water courses.

The following issues emerge for possible discussion in the symposium:

1. What is the extent of damage caused by these ancillaries using bagasse and molasses, both air pollution and water pollution?
2. To what extent the existing arrangements have proved successful or deficient?
3. To what extent the wastages and the washings of caustic soda can be recycled in the operations?
4. To what extent good house-keeping and careful supervision of equipment should be encouraged to keep the problem under control rather than go in for costly equipment?
5. What should be the contribution by the various agencies viz., internal management of the sugar factory, experts of the specialised agencies like Deccan Sugar Institute, National Sugar Institute, Kanpur, etc., Asso-

ciations of Sugar Industry, Association of Distilleries and lastly the experts available in the academic institutions like IIT and other forums?

6. What are the decisions that need to be taken as part of the new sugar policy to tackle this problem in an efficient manner?
7. Is it necessary to compel by Government orders that no site selection for a new industry should be approved unless there is an environmental clearance by the Competant Authority?
8. Is it desirable to include the cost of pollution control as part of the project cost, with assured financial assistance from the Central financial institutions and the State Government?

In my opinion, there is need for an all round campaign for educating the social workers, the staff, R & D personnel, associations of sugar industries, distilleries etc., about the emerging and acute crisis created by the air and water pollution that results in the use of the by-products of sugar industry both in the boilers and later in the production of the by-products. It is also necessary to involve the entire factory staff and the office bearers of the factories in any campaign for such control, instead of treating it as a purely technical problem. Also the All India Association of sugar industries, distilleries, State Governments should take this problem very seriously and take effective steps to prevent pollution in the first instance by adopting some of the following methods.

a. Even during site selection, no permission should be given without the clearance of the Environmental Board of the State Government.
b. Total involvement of the staff and other personnel in cleanliness, avoidance of wastages and proper supervision and maintenance of the equipment in the factory premises.
c. Inclusion as part of the project estimates, adequate provision for installation of anti-pollution measures as per expert opinion.
d. Liberal and timely financing of such projects by the financial institutions and the State Government.
e. Lastly proper monitoring and follow up of these anti-pollution measures by all concerned.

I find from the list of the papers for this symposium, that there is a wealth of technical studies and analysis which is going to be presented. While I am confident that this will lead to a lot of knowledge and upgradation of ideas, I would only request that the practical aspect of converting such knowledge into useful, affordable techniques in the industry has to be kept in mind. Already, the project cost is so high that many of the units especially in the backward areas are finding it difficult to raise resources, and, if installation of anti-pollution measures is going to add to this cost in a substantial manner, it will make the units per se non-viable. My plea would be to strike a golden mean — to maximise the utilisation of the existing systems and supplement it by proven or potentially cost-effective techniques. I am sure that the representatives of the financial institutions present in this meeting would encourage and welcome such innovations and finance them liberally. We may even think of providing incentives as a measure of encouraging the use of these measures.

I would once again thank all of you for giving me a patient hearing and wish you all success.

SYMPOSIUM THEME: By Prof. H. Veeramani

We have selected the environmental problems, especially water pollution aspects of distillery, paper and allied industries as the main theme of this symposium for a number of reasons:

- Complex nature of process wastewaters
- High strength (BOD, COD) potential toxicity of the effluents ing a concrete remedy
- Inadequacies of the convent treatment methodologies
- Wide choice of emerging/new nology options and broad ran applications
- Update of new technology thr experiences of prototype installa put up in the past two to three in the country
- Evolve strategies for techno absorption and adoption releva the requirements of Indian dist and paper units.

The sugar industry is indeed f nate in that there is no major app pollution potential — the sugar res in concentrated molasses is use alcohol production and the solid bagasse residue traditionally us boiler fuel is now being utilised inc ingly for paper production. Alcoho tillery production is based on sugar molasses — mother liquor from e oration — crystallisation operatic the sugar factory. It consists mai sugar constituents besides inor compounds present in cane jui added during clarification. While distilleries have batch fermenters have switched over to continuous This has cut-down the volume of wash generated by one-third — versus 15:1 (liter spentwash per alcohol production) with only a m nal change in pollution load.

A theme paper from VSI gives a of the art appraisal of present prac technology options, progress and ievements of new prototype pr implemented or in execution in M rashtra. Major treatment op presently available to distilleries in integrated multi-stage biologica physico-chemical treatment, co tion/incineration technology and posting processes. The major thr the symposium endeavours to brin the significant achievements and p tial opportunities towards viable

...ms for the conservation ...able energy and raw material ...urces.

...e 12 technical papers discuss case ...ries of mesophilic and thermophilic ...as generation systems, evaporation ...oncentration schemes targeted for ... pollution, aerobic composting and ...lopments in instrumentation for ...as and stack-gas monitoring.

...ther molasses based products like ..., oxalic acid, citric acid etc., coffee, ...h, food products and allied opera-... also result in high strength waste-...rs amenable for anaerobic ...essing with biogas recovery poten-...

... long-term solution should consider ...twash as a chemical feedstock for ...ufacture of basic chemicals ...hane, propane, butane, citric acid, ... acids etc., by new bio-conversions ... as biomethane (biogas) now a ...mercially successful technology ...d on waste utilisation.

...e have at many locations in Maha-...tra, either a distillery or paper mill ...oth as a vertical integration of the ...r factory and are faced with a ...ng situation of effective treatment ...e different process wastewaters.

...e also have a large number of ...-paper mills in the country based on ...ultural residues — rice, wheat ...v, bagasse, etc. These units do not ...t have a chemical recovery system ...eclaiming caustic soda from the ... pulping liquor. In these cases, ...e only one-third of the fibrous raw ...rial results in the finished paper ...ucts, the remaining two-third ends ... the process wastewaters as a col-...d effluent of complex organic com-...ds — lignin and polysaccharides.

...he bleach plant section is another ...r source of coloured effluent for all ... producing cultural paper grades. ... pollution potentials of 30 TPD mini paper mill and 100 TPD integrated paper mill are comparable in terms of BOD load.

Caustic soda of value in excess of Rs. 1.5 crore besides valuable organic chemicals with energy (calorific heat) potentials are drained annually from each unit in the mini-mill sector. This brings into focus the need for an efficient chemical recovery system, as a long term remedy. A paper from CPPRI, Saharanpur discusses the current status of DARS initiated with UNDE support.

Alternatively, energy can be recovered as biogas from black liquor by anaerobic processes and developments in membrane technology could perhaps be considered for chemical recovery. Besides these, the immediate problem of water pollution control, conservation of water and fiber resources as well as safe discharge of treated effluents from operating paper mills must also be tackled. We have 10 technical papers dealing with many of these relevant issues — biogas generation systems, fiber recovery, water conservation/reclamation practices, colour removal, conventional and pure oxygen activated sludge process, soda recovery as well as two theme papers overviewing the needs, demands and practices of the paper industries.

A special session on project financing is included in view of the significant capital costs of many of these new technologies and systems. Papers by IDBI, ICICI highlight financial packages available to the paper, distillery and allied industries for effluent treatment systems with case histories of projects financed for distillery spentwash based on membrane and incineration technologies.

A panel discussion session is also scheduled for a wider participation of the expertise available in the country, with panel members drawn from the audience.

The symposium will provide a platform for the dissemination of available technology sources, in-house developments, adaptive technology and know-how from foreign collaborations, case histories of prototype installations as well as emerging technologies and developments ready for commercialisation. We have an audience of about 150 representatives from industries, consultancy, regulatory, financial and governmental agencies as well as technology/equipment suppliers and leading institutions. Papers will be presented by senior executives representing equipment manufacturers, industries engaged in the production of sugar, alcohol, paper and allied products/operations, consultancy, organisations and financial institutions.

Highlights of technical sessions

Technical Session - 1

Theme Papers: Sugar, Distillery, Paper. Chairman: Prof. A.P. Kudchadker, Deputy Director, IIT Bombay.

A theme paper by Vasantdada Sugar Institute, Pune presented an up-date on the environmental pollution problems of sugar and distillery units in Maharashtra and the current status of various on-going as well as completed projects. Sugar factory operations do not contribute to any regular discharge of complex process effluents. Conventional treatment technologies based on primary sedimentation and secondary biological processes adequately handle the discharges (500-700 cu.m. per day for 1250 TCD sugar factory) within prescribed statutory limits. However, distillery spentwash is a strong wastewater (spentwash: Alcohol production being 1.5-20:1 by volume). Several options are available based on biogas generation, concentration-incineration and composting techniques. The paper focussed on the salient features of all these methods and appraised the delegates the current status of on-going as well as executed projects based on the three major available treatment options.

The second theme paper, presented by Esvin Advanced Technologies Ltd., Madras (Seshasayee Group) considered the problems and prospects of pollution abatement for small paper mills. The small paper mills which account for nearly one-half of the total installed capacity for paper and boards in India are also held responsible for contributing to 75% of total pollution load discharged by the paper industry. The principal reason for this situation is the lack of a commercially viable chemical recovery system within the present constraints of small chemical pulping capacity and the use of straw as primary raw material. The paper reviews relevant global developments as well as indigenous efforts in the context of emerging technologies leading to chemical recovery/energy conservation potentials.

Technical Session - 2
ANAEROBIC TECHNOLOGIES: DISTILLERY. Chairman: Dr. R.D. Deshpande, Consulting Adviser, Tata Research, Development and Design Centre, Pune.

Successful application of anaerobic technology for biogas generation based on distillery spentwash is illustrated by case histories of full scale operating installations in India. Thermophilic process for treatment of distillery effluent is presented as a case study of an installation operating successfully for the past two years at Rampur Distillery and Chemicals Ltd., for handling 1000 cu.m. per day of effluent at a capital cost of about two crores (rupees). The system with BOD reduction upto 90% generates biogas to meet the total energy requirement of the distillery (capacity 50 KLD).

The salient features of the Upflow Anaerobic Sludge Blanket (USAB) reactor system was presented by Western Paques India Ltd. highlighting the on-going project in execution. A paper by Dharamsi Morarji Chemical Co. Ltd., considered integrated anaerobic-aerobic treatment of distillery spentwash. The anaerobic reactor based on the fixed film technology (BACARDI) is operating successfully at Andhra Sugars Ltd. and the biogas generated routinely used as boiler fuel. Two novel reactor configurations based on fluidised bed and a hybrid fixed film types were presented by Hindustan Dorr Oliver Ltd. with typical flow-sheets for handling molasses based yeast plant process waste waters and distillery spentwash and stipulated performance of prototype installations under execution.

Technical Session - 3
ANAEROBIC-AEROBIC INTEGRATED TREATMENT: SUGAR, PAPER. Chairman: Prof. H. Veeramani, CESE, IIT Bombay.

The major highlights of this session include application of anaerobic technology for biogas generation and flotation principles for fiber recovery with examples of operating installations in the paper industry and a conventional integrated effluent treatment facility for handling the process wastewaters from an operating sugarmill — distillery complex in Maharashtra.

A paper from Shetkari S.S.K. Ltd., Sangli elaborated on the integrated treatment facility at their complex consisting of activated sludge process and anaerobic lagoon/filter for handling all the wastewaters and utilising the diluted treated wastewater for irrigation purpose. Pudumjee Paper Mills Ltd. shared their experiences of more than one and a half years of operating the first full scale installation for the anaerobic treatment of pulp mill black liquor by the AN-OPUR-P installation. This plant based on Sulzer technology generates biogas suitable as boiler fuel. The integrated anaerobic-aerobic treatment facility has enabled substantial energy savings. A related paper by Western Paques India Ltd., Pune highlighted the potential applications of the UASB reactor system for handling process wastewaters from pulp, [...] cessing and allied operations. Rec[...] of pulp fiber from paper machine [...] water by dissolved air flotation m[...] was discussed by Krofta Engin[...] Co. Ltd., Chandigarh with case [...] ies of typical operating units i[...] country. The system in addition [...] the benefit of water conser[...] through water recycle.

Technical Session - 4
TRENDS/EMERGING TE[...] NOLOGIES: DISTILLERY, PA[...] Chairman: Dr. D. Kantawala, Env[...] mental Engineering Consult[...] Bombay.

This session focussed on the [...] issues of decolourisation of pul[...] paper mill effluents by biol[...] methods. Currently, this is one [...] residual problems of global intere[...] two papers highlighted develop[...] trends. A paper by CESE, IIT Bo[...] reviewed the emerging biotechno[...] cal methods and the potential pr[...] of fungal strains as a viable solutio[...] presented the results of on-[...] research work. Related work in a [...] mill by SPB Projects and Consul[...] Ltd., Madras presented results of [...] using isolated strains of white rot fu[...] on raw effluents and the role of su[...] mentary carbon sources and gr[...] nutrients on the efficiency of the c[...] removal process. These two p[...] evinced considerable interest fro[...] delegates. A theoretical analysis o[...] air oxidation process for disti[...] spentwash by simulation techni[...] adopting a bubble column reactor [...] presented by IIT, Bombay (C[...] Engg.). Another paper on aerobic [...] posting of spentwash presented by [...] chand College of Engineering, Sa[...] attempts to offer one more trea[...] option. This is based on admixin[...] spentwash with press mud as a fille[...] biological conversion to a com[...] material comparable to farm [...] manure. The efficacy of the biocon[...] sions and the quality of the resu[...] manure and potential secondary p[...]

nts need to be assessed quantitatively om the experiences and results of pro- type systems and field trials.

echnical Session - 5

COMBUSTION PROCESSES: ISTILLERY, PAPER. Chairman: T.S. enkataraman, President, Esvin dvanced Technologies Ltd., Madras.

Mini-paper mills do not recover pulp- g chemicals (caustic soda) in the sence of an economically viable covery system. Central Pulp and per Research Institute, Saharanpur s initiated pioneering work in the untry with UNDP assistance for veloping a Direct Alkali Recovery stem (DARS), based on fluidised bed mbustion of black liquor with iron ide at 850-950°C and caustic soda generated by hydrolysis of the inter- ediate sodium ferrite. CPPRI esented the status of development ork and the various engineering pro- ms and scale-up criteria for full scale stallations.

Combustion of pre-concentrated dis- lery spentwash in yet another option ailable was illustrated by the papers esented by Praj Counseltech Ltd., ne and Thermax Ltd., Pune. The two ganisations are planning to promote ntly a system named SPRANNI- IERM. The preconcentration of spent sh will be done by direct contact aporation using hot flue gas in a ven- i type unit and subsequent incinera- n accomplished in a fluidised bed mbustion reactor with potential for ergy recovery. This system would be fered as a zero pollution treatment ckage. A paper by Netel Chromato- phs, Thane discussed developments chromatographic methods for biogas d stack gas analysis.

chnical Session - 6

ENVIRONMENTAL PROJECT NANCING & MANAGEMENT. airman: J.L. Thakar, Managing rector, Dharamsi Morarji Chemical . Ltd., Bombay.

A full session on project financing was scheduled as a logical follow-up of the technical sessions which highlighted the various technologies and treatment options and the capital intensive nature of the environmental projects for distillery, paper and allied industries. A paper from Industrial Development Bank of India (IDBI) highlighted various schemes available for providing financial assistance — Venture Capital Fund Scheme, Energy Audit Subsidy Scheme, Equipment Finance for Energy Conservation and Technology Upgradation Scheme.

Another paper by Industrial Credit and Investment Corporation of India Ltd., Bombay also discussed certain financial schemes like Venture Capital Assistance, Program for the Advancement of Commercial Technology (PACT) and modemisation scheme. ICICI also gave case histories of special schemes used to finance effluent treatment plants based on membrane technology and incineration technology for handling distillery spentwash.

Panel discussion session

Moderator: K.P. Mohandas Rao, Managing Director, Hindustan Dorr Oliver Ltd., Bombay.

Panelists: 1. Prof. S.V. Arabatti, Vasantdada Sugar Institute, Pune. 2. Dr. D. Kantawala, Environmental Engineering Consultants, Bombay. 3. Capt. S. Raja Rao, Director, Department of Ecology and Environment, Govt. of Karnataka, Bangalore.

The panel discussions with the participation of delegates considered several issues:

1. Power demand for integrated anaerobic-aerobic treatment installations and substantial energy savings obtainable in the aerobic stage by an increase in the efficiency of the anaerobic stage.

2. Apprehensions relating to inhibition of anaerobic reactions by sulphate reducing bacteria were cleared by the experiences of successful full scale installations handling distillery spentwash and the biogas containing 1.5-2.5 per cent hydrogen sulphide without any deleterious effect on BOD removal or gas generation.

3. Aesthetic and legal considerations of the discharge of treated effluents into the receiving bodies.

Best paper awards

Process and Plant Engineering Journal (Shanvik Publications Pvt. Ltd., Bombay) had instituted awards for the three best papers presented at the Symposium.

1. **Best Paper:** 'Thermophilic Process for Treatment of Distillery Effluent — A Case Study'. Author: M.K. Gupta (Dy. General Manager), Rampur Distillery & Chemical Ltd., Rampur.

2. **Second Best Paper:** 'Environmental Pollution Problems of Sugar and Distillery Units in Maharashtra'. Authors: Dr. D.G. Hapase, Prof. S.V. Arabatti and P.L. Kulkarni, Vasantdada Sugar Institute, Pune.

3. **Third Best Paper:** 'Biotechnology Options for Removing Colour from Pulp Mill Effluents'. Authors: Ms. Anuj Singh and H. Veeramani, CESE, IIT Bombay.

Summary and recommendations

The symposium dealt in detail with treatment options — biogas generation, incineration and aerobic composting for handling distillery spentwash. The result of some of the prototype installations based on different technologies were presented.

It appears that a large number of distillery ETP projects are at an advanced stage of execution/commissioning a further results would become availal by the end of this year. Anaerobic tec nology for handling distillery spentwa is a well proven technology curren and can efficiently handle sugarca molasses based spentwash. The biog generated can be used as boiler fuel a is capable of meeting 75-100 per c of the steam requirement of the dis lery and is determined by the bo design/efficiency and distillery practi

An interesting development is SPRANNITHERM process wh combines direct contact flue gas eva oration and fluidised bed combustion the disposal of distillery spentwash. T technology with necessary add-o could provide a system with essentia zero discharge of aqueous pollutants a atmospheric emissions. The results prototype aerobic composting syste for handling spentwash in admixtu with press mud and field trials on s tability as manure are awaited to co firm the claims of the proponents of t technology.

Anaerobic treatment of mini-pa mill bagasse black liquor to gener biogas is also a proven technology a together with aerobic treatment enta significant energy savings and reduc sludge production. The problem decolouration of paper mill effluents biological methods is a topic of re vance and considerable interest to paper industry.

Financial institutions like IDBI a ICICI have several attractive schem to offer to potential paper/distillery un to put up effluent treatment plants view of the capital intensive nature these projects.

The symposium also brought i focus the wealth of technology a expertise presently available in country from indigenous sources tackle the environmental problems the sugar, distillery, paper and alli process industries.

Harmonisation of customs tariffs, and import policy nearly complete

The government has almost finalised the harmonisation of customs tariffs with the import policy. This is expected to become an important feature of the new export-import policy to be announced on April 1, 1990. Harmonisation of tariffs will go a long way in facilitating the work of importers as well as exporters, because similar code numbers will be used both in the customs tariff schedules as well as the import policy, according to official sources.

Trade and industry have been demanding harmonisation of customs tariff schedules with the import-export policy on the ground that the customs staff does often pose problems in regard to import of items where the description may differ from the items mentioned in the customs tariff schedules and the import policy.

Mr. B.C. Rastogi, presently additional chief controller of imports and exports, was transferred from the customs department mainly to do the job harmonisation of tariff and simplification of documentation work essentially pertaining to exports as well as of procedures.

The government, it may be recalled, recently approved the documentation of pre-shipment export cargo. The exporters will have to prepare only two master documents instead of nearly 25 as at present. The commerce secretary, Mr. S.P. Shukla, will soon hold a meeting of officials belonging to various ministries and departments as well as public sector corporations and representatives of trade, industry and exporters to discuss implementation of the simplified export documentation procedure.

It may take some time before the exporters are able to avail of the new simplified documentation facility. The ministry of commerce is keen on ensuring prompt implementation of the standard documents to be prepared by the exporters relating to preshipment of cargo. At the same time, it does not want to hasten the implementation unduly to avoid operational problems of serious nature. However, minor irritants and difficulties can be resolved expeditiously as they surface during implementation, it is pointed out.

The government, before approving the new documentation procedure, had consulted the different ministries, departments, shipping lines, insurance companies, port authorities as well as representatives of trade and industry. As a result, there may not be much delay in putting into effect the new simplified export documentation procedure, it is stated.

The simplification work relating to export documents and procedures, as also the harmonisation of customs tariff schedules with that in the import policy, in fact, started when Mr. Dinesh Singh was the Minister of Commerce. The new Commerce Minister, Mr. Arun Nehru, immediately after assumption of office, has asked the officials to expedite the work further. He had made it clear that he would like the exporters to devote more attention to export promotion rather than chase the different departments for completing the formalities.

IMC CALLS FOR IMPROVEMENTS IN FISCAL POLICY

The Indian Merchants' Chamber (IMC), in a pre-Budget memorandum submitted to the Union Finance Ministry, has called for a fiscal policy that is designed to promote healthy development of the economy, give a fillip to the savings rate, reduce mounting deficits with curbs on expenditure and improved tax mobilisation efforts, promote investment with incentives, and correct the country's balance of payments external debt position.

In promoting development, the I wants the government to discard moth-eaten populist notion of level down everybody to reduce inequali and instead lay emphasis on genera of wealth. Further, to ensure greater compliance, the chamber calls for b able tax rates, as also rationalisation simplification of tax laws. The IMC special emphasis on the tax sys pointing out that past experience shown that higher rates do not neces ly lead to higher collections, as they more likely to entail a greater pro sity to evade tax, and thereby, incr corruption. Specific proposals regar NRI investment in areas such as h ing and gold have also been mad

In direct taxes, the IMC has calle a scrapping of Section 115J of Income-Tax Act requiring a mini tax on book profits, tax exemptio dividend income, and the restorati tax exemption facilities to chari trusts that have invested in deben of public limited companies, an other things. Reduced duties for h products, reduction in project in duties, simplification of the m structure, and excise concessions o basis of value added instead of tur for small-scale units are among the rect tax incentives suggested.

APPOINTED INDIAN VACCI CORPORATION CHAIRMAN

Dr. S. Varadarajan has appointed chairman of the Indian cines Corporation Limited (IVC according to an official. Dr. Va rajan, former Secretary to the D ment of Science and Technolog former Director General of CSI now chairman of the Consul Development Centre, set up b Department of Scientific and I trial Research. He is also chairm the National Council of Science eums.

IPRS cover for chemicals soon

The Union Commerce Ministry is ely to extend the International Price imbursement Scheme (IPRS) to orters of basic chemicals and pharceuticals soon. The ministry is derstood to be of the firm view that scheme would help to maximise the ue added content in chemical ports. The content is already 70 to 90 cent in the case of some products.

For the past few years, exporters of micals have been trying to impress on the commerce ministry the need extend the IPRS to chemicals for ing a fillip to exports. They have d the scheme's success in boosting exports of engineering products. The istry seems to have made up its d on the issue following a detailed logue with the president of the Fedtion of Indian Export Organisations EO), said Mr. Ramu Deora, in New hi recently.

Under the scheme, the public and pri- sector companies supplying raw erials to downstream chemical units the purpose of export production ld be reimbursed the differential een the ruling high domestic prices the low international prices. Mr. ra is understood to have assured the istry that the measure would help country to achieve more than 10,000 crores worth of chemicals rts by 1995.

e also pointed out that the measure ld subserve the government's objec- of strengthening the labourive small-scale sector, "because mall units are unable to import st advance licences various raw rials, particularly solvents and hazs liquid chemicals." The IPRS d not only bolster the small sector's y to compete in the world market, would also multiply the industrial ity manifold, he assured.

plaining the rationale of the mea- he pointed out that presently many medium and large chemical exporters are importing raw materials under the advance licence scheme, resulting in considerable outflow of foreign exchange. But under the IPRS, the domestic producers of raw materials, both in the public and private sectors, would be able to sell their products indigenously against advance licences to downstream units engaged in manufacturing value-added export goods like dyes and dye intermediates, bulk drugs and formulations, pesticides, inorganic and organic chemicals etc.

CALL TO MOVE TOWARDS CENTRALISED TAXATION

In a pre-Budget memorandum submitted to the Union Finance Ministry, the Greater Mysore Chamber of Industry, has called for a steady movement towards a centralised taxation system. It has said that the existing multiple taxation system was characterised by varied rates of taxes like sales tax and entry tax being imposed by the states.

The memorandum has suggested simplification of tax laws and speedy reforms to usher in uniformity in the matter of classification of excisable goods and other procedural issues. It also called for the establishment of a suitable joint committee with the members drafted from the government and the industry to hold monthly meetings, on the lines as modvat meetings, to find solutions to problems on various issues.

The chamber has sought duty relief on items supplied free of cost by the Defence Department to the manufacturers for use in the manufacture of finished goods and duty exemption in respect of energy-saving devices and CNC systems.

On the customs side, the chamber has urged for rationalisation of import duty structure on raw materials, components and finished goods in such a manner that duty should be lower on raw materials than on finished goods.

The memorandum has stressed the need for a long-term fiscal policy in respect of both direct and indirect taxes to ensure a greater degree of certainty, finality and continuity. It has asked that the open policies being pursued in the country be pursued, rather than reversed, in order to ensure that the gap between India and other advancing countries is narrowed down. The memorandum has highlighted the need for greater export initiatives through fiscal encouragement, reduction in the cost of industrial inputs and a single window for all clearances.

As regards direct taxes, the memorandum has pleaded for the removal of arbitrary ceilings on business expenditure, enlargement of the permitted areas for reinvestment of capital gains, withdrawal of tax on the book profits, enhancement of ceiling for personal tax, extension of benefits under section 80 HHC to export of services, parity in the treatment of public sector and private sector employees under the voluntary retirement scheme and slab rates of gift tax as were prevailing earlier.

TWO MORE SCIENCE CENTRES PLANNED

The National Council of Science Museums (NSCM) has proposed to set up two district science centres in Vijayawada and Calicut during the Eighth Plan.

According to official sources at Gulbarga, the work on the building has already commenced at Calicut. NSCM would soon establish a regional science centre at the Venkateswara University campus at Tirupati.

At present, science centres are functioning at five places — Purliani (West Bengal), Gulbarga (Karnataka), Tirunelveli (Tamil Nadu), Dharmapur (Gujarat) and Kohima (Nagaland).

COMPANY NOTES

Gujarat's first nitroaromatic project taking shape

Clarisis Organics Limited, a Baroda based Public Limited Company with NRI status is executing a project for the manufacture of para nitrochloro benzene and ortho nitrochloro benzene (PNCB/ONCB), which are the raw materials for many chemical and pharmaceutical industries. The company possesses a letter of intent from Government of India to produce 3600 tons per annum of PNCB/ONCB and 2400 tons per annum of acetanilide, wherein MCB, nitrobenzene and aniline are the basic raw materials which are going to be manufactured also by the company. The project is being set up at Village Mokshi, Taluka - Savali, District Baroda, a notified state backward area. All the requisite raw materials for the project are available within the close vicinity of the plant site.

The products from the proposed project, mono chloro benzene (MCB), nitro chloro benzene (PNCB/ONCB), spent sulphuric aacid, hydrochloric acid, DCB have a ready use in the user industries. The demand supply gap of these products is significant with the growth in the downstream products such as paracetamol, dye intermediates, rubber chemicals and insecticides. Further there exists export potential for some of these products proposed to be manufactured.

Shri Ashok V. Patel, a technocrat, is the chief promoter of the company, having thorough education in USA and have worked long years in the chemical industry in USA. Shri B.P. Patel I.C.S. (Retd.) is the Chairman of the company, who was in public service in the areas of developing government policies, managing various central government departments and assisting the public and private sector companies in various capacities, such as Chairman of State Trading Corporation, founding Managing Director of State Bank of India and simiiar illustrious positions.

The basic know-how for the project is largely indigenous. Mr. Ashok V. Patel along with experienced engineers under the guidance of various technical consultants has contributed to the shaping of the know-how for better optimisation of raw material and utilities. Moreover, for the critical NCB distillation section, the company has utilised the proven 'SULZER' technology for the first time in India. The detailed engineering for the project is being undertaken by Industrial Consulting Bureau (ICB) Bombay, who have vast experience in executing petrochemical and chemical projects.

The capital outlay of the project is estimated at around Rs. 6 crores, which is being financed by the NRI promoters, their associates, plus term loan already sanctioned by ICICI in participation with IFCI. ICICI and IFCI are also subscribing to the equity of this project.

The site activity of the project is in full swing. Civil construction work is almost completed and site fabrication is in progress. Orders for all items have already been executed. The plant is expected to commence trial production by August 1990 and commercial production immediately thereafter.

MAFATLAL TIES UP WITH ITALIAN COMPANY

Mafatlals, in collaboration with an Italian chemical giant, is setting up the country's first 100 per cent export oriented unit for the production of copper phthalocyanine crude (CPC) at Ranoli near Baroda in Gujarat.

The $10 million project is expected to be commissioned in the first quarter of 1992 at the existing complex of Indian Dyestuff Industries, (IDI) with an initial production of 2,000 tonnes p annum, which will be raised to 4,0 tonnes in the next three-four years.

A letter of understanding has be signed to this effect between M Yoginder Mafatlal, Chairman of I and Dr. Zanini, Managing Director the Italian company Enimont, which the sixth largest chemical company the world with an annual turnover $16 million.

Enimont will have a 65 per cent st in the project with the balance 35 cent coming from IDI, according to Atulya Mafatlal, Executive Directo IDI. The technical management wil taken care of by Enimont with a Mar ing Director representing that comp

Pre-feasibility study for the pro has been completed and deta engineering designs are getting re The company is applying for a lette intent shortly and expects the work the project to commence during second half of 1990.

CPC is an important pigment use the plastic, rubber and printing industry. Phthalic anhydride is the b raw material for CPC, which is e available from IDI. The local produc of CPC at present is around 3,000-4 tonnes per annum, of which IDI a produces 500 tonnes to meet the do tic demand.

The world production of C according to Dr. Zanini, is ar 55,000 tonnes. The major producers consumers of this product are Ja USA and West Europe.

GASOLINE SPARED FROM EXCISE NET

The Union Government has ex ted liquefied natural gasoline spiked into crude petroleum from tral excise duty. Alpha interferon injection, a life saving drug, has exempted from customs duty.

Finolex PVC project

Financial institutions have sanctioned a loan of Rs. 80 crores for Finolex Pipes one lakh tonne PVC project coming up at Pawas near Ratnagiri, costing about Rs. 300 crores.

The company has already lined up the promoter's contribution of Rs. 21 crores. Finolex is proceeding with the civil works despite delay on the part of the Controller of Capital Issues in okaying the company's proposed public issue of around Rs. 160 crores. Clearance of several public issues are pending with CCI. They are likely to be okayed only after forthcoming assembly elections.

When Finolex formally comes out with public issue, the project would have made a good deal of progress on the ground. Work on the ethylene handling terminal is proceeding briskly at Pawas.

Finolex has already tied up with Hoechst AG and its subsidiary Uhde for process and engineering knowhow. The company hopes to begin production of PVC in 1992 from imported ethylene and EDC. The second phase of the project will witness the implementation of the caustic/chlorine project by Finolex Cables at an estimated cost of Rs. 210 crores.

The company is in touch with several international firms for supply of ethylene for its PVC project. Some entrepreneurs have suggested that with its terminal, Finolex would be in a position to supply ethylene for several other projects in the regions being promoted by Maharashtra Petrochemicals Ltd. (MPCL).

The latest Hoechst technology will provide for total recycling of wastes, ensuring that none of the effluents will be discharged into the air or sea. The oxyhydrochlorination process for ducing VCM will use pure oxygen, the result that unused nitrogen with VCM will not be released int air, as happens in conventional plants, according to company sou

Recycling of all wastes will hel company convert the area into a g belt, it is claimed. Hydrochloric wastes will be recycled to recover c ine to feed the EDC plant. Clean w thrown up in the process can be to raise orchards. Finolex has acqu 400 acres for the project at Pawa

A good portion of PVC resin wi captively consumed by the compa the manufacture of cables and p Even after it reaches full produc there will be a gap in the demand supply of PVC: demand for the res expected to exceed four lakh tonne 1993. Another group company, Fin Machines Pvt. Ltd., is manufactu twin-screw extruders for producin range of PVC products. The group thus be in a position to supply the r knowhow as well as machines to duce finished goods once the PVC ject goes on stream.

JAYASHREE CHEMICALS

The Board for Industrial and Fi cial Reconstruction (BIFR) has s tioned a Rs. 14.63 crore rehabilita scheme for Jayashree Chemicals l ited, a leading manufacturer of ca soda and chlorine. The company's r ufacturing unit is located at Ganja Orissa. According to Mr. C.R. Du chief executive of the company, rehabilitation scheme will be fina through promoters' contribution Rs. 3.5 crores and the rest by bor ing from banks, IDBI and other fi cial institutions. The completion o scheme will help increase the pre production capacity of 16,500 to per annum to 29,700 tonnes per an The capacity is proposed to be incre by installing the latest membrane having low power consumption.

B setting up Rs. 66.6 crore veterinary drug unit

B group of Vijay Mallya is setting Rs. 66.6 crore project to manufac- tylosin tartrate, a veterinary drug l in the treatment of diseases of nes, pigs and buffaloes. A one-time stment of this size is unheard of in an private sector pharmaceutical istry. It is being set up by UB Phar- euticals Ltd., a group company.

he project, to come up in Karnataka, produce 300 tonnes of tylosin tar- a year, yielding an estimated turn- of Rs. 60 crores. The company is red by Mr. Vijay Mallya, with P.N. Venugopalan, and Dr. S. tterjee as directors.

he new company will have an ty base of Rs. 22.2 crores. In its ication to the Government seeking ter of intent, the directors have said the project cost will be raised through foreign exchange borrowings/ suppliers credit of Rs. 7.44 crores, term loans from financial institutions to the tune of Rs. 34.75 crores. Loans from promoters will make up another Rs. 2.2 crores.

The main attraction to diversify into this area appears to be the fact that veterinary formulations do not come under price control. It seems, Mr. Mallya is keen on diversifying into virgin areas.

GUJARAT AMBUJA PLANS PETROCHEM PLANT

The Gujarat Ambuja Proteins Ltd. promoters plan to set up two new projects in Gujarat, petrochemicals and alloy casting at an estimated cost of Rs. 110-crores. Two separate companies will be formed for these projects. Mr. Vijay Gupta, Chairman and Managing Director of Gujarat Ambuja Proteins Ltd. said that polyol and propylene peroxide project will be set up near Baroda in the associate sector at a cost Rs. 80-crores with 10 per cent equity participation of Gujarat Industrial Development Corporation (GIIC). The project will hike a 10 per cent IPCL participation.

Thirty per cent equity will be offered to the public and the remaining to financial institutions. Raw material like propylene will be obtained from IPCL. According to him, all formalities regarding the project will be over by June this year and the commercial production should begin by June 1992. Foreign collaboration for the project has not yet been finalised but it was likely to be with either Germany or Japan, he said.

The production capacity of polyols project would be 10,000 tonnes per annum and for propylene peroxide it would be 6,000 tonnes per year.

BPCL's profits up by Rs. 52 crore

Bharat Petroleum Corporation Ltd. (BPCL) has attained a record profit of Rs. 242.43 crores during 1988-89 (before depreciation, interests and tax) as against the previous year's Rs. 190.25 crores. Mr. R.K. Gajree, chairman and managing director of BPCL, told newsmen at Chandigarh on February 16, that the profits for the current year were estimated at Rs. 270 crores.

He said the BPCL refinery at Bombay achieved a crude throughput of 6.15 million metric tonnes (MMT) during 1988-89 which was 102.2 per cent of the installed capacity, the highest so far in any year. During the current year, the crude throughput was expected to be approximately 6.50 MMTs.

Mr. Gajree said during 1988-89 the total sales of the corporation increased to 9.33 MMT from 8.56 MMT in the previous year, and it was expected to cross 11 MMT during the current year.

BPCL has also initiated an R & D pilot plant project for converting natural gas into high value middle distillates at the refinery during May 1989.

The Corporation has planned to instal another refinery in central India. The preliminary report has been submitted to the Central Government for clearance.

Mr. Gajree said BPCL has made concerted efforts to maximise production and sales of LPG. Sales of LPG increased approximately to 4,50,000 MT in 1988-89, registering a growth of 12.46 per cent. During the year 1988-89, LPG bottling plants filled approximately 280 lakh cylinders, achieving 122 per cent of the target, he said.

Capacities of the existing LPG b ling plants at Lalru and Hissar are b doubled, and in addition a new bottling plant at Piyala (Haryana) w also go into commercial produc shortly, he said.

Meeting the high growth deman petroleum products in north-west I Mr. Gajree said that the Corporatio decided to provide additional tan facilities at existing Patiala, Patha and Jammu depots and the rec commissioned Srinagar depot.

Besides a new depot was under struction at Bhatinda and there w proposal to set up installations at K and Jalandhar.

BPCL has also planned to hav new retail outlets of motor (petrol), high speed diesel, 10 LPG tributors and one kerosene oil deal this region during 1990-91, he sa

Highlights in Chemical Technology (Part 1)

RBON MICROFILTRATION MBRANE UNVEILED

microfiltration filter for industrial consisting of a carbon membrane on rbon fibre substrate was recently iled by Le Carbonne Lorraine. The carbon microfiltration membrane be launched in early 1990. The fil- as a microporous substrate which is be of woven and bonded carbon with the filtering microporous r of carbon bonded to the inside of tube. Pores sizes on offer will be 1-0.2 micron. The company has filtration filters currently under de- pment, which should come on to the ket in a year or so, which will offer sizes down to 70-100 Angstrom.

ecause the tube is made from on fibre it is immensely strong and to handle high pressures. The use arbon for both the filter and sub- e ensures that the filter will offer the nal high corrosion resistance assoc- l with carbon and graphite equip- t, it can be used in both traditional innovative separation applications it will be able to treat corrossive lucts like sulfuric, phosphoric and ochloric acids.

he membrane tube can be either m or 100 cm long in bundles from 289, which, with 100 cm tubes s a 6.1 m^2 membrane. End-caps also be made of carbon. Two types ousing will be offered: stainless l or thick walled PTFE. Operating peratures are up to 180°C. In tradi- al filtration areas, Le Carbonne sees membrane fitting in with other mic membranes. (*The Chem Engg.* 989, p. 13).

LSONB -- A NOVEL SUPERAB- RBENT CROSS-LINKED WITH LYACRYLATE

llied Colloids (UK) have recently unveiled a novel superabsorbent cross-linked with polyacrylate in powder form, which absorbs 40-times its weight of water. The company has developed this superabsorbent for sanitary uses, such as nappies. Current applications include dewatering coal mines, agriculture in dry areas where the polymer can bind moisture to plant roots and improving the efficiency of phase-change heat storage systems which use ionic salts as the working material. Mopping up liquid spills is another idea. The company researchers are currently working with Courtaulds Fibres on a superabsorbent fibre.

Superabsorbent polymers are made by polymerising sodium acrylate, acrylic acid, acrylamide or acrylonitrile, reports David Marshall of Allied Colloids, although sodium acrylate is preferred for sanitary products because it uses a non-toxic monomer. Cross linking prevents the polymer from dissolving completely and leaves an open structure which allows a kilogram of polymer to absorb upto 40 times of the liquid. The result is a non-toxic gel which, unlike a sponge, retains the liquid even when squeezed. (*The Chem Engineer*, 11/1989, P. 29).

AN UPDATE ON POLYMERIZATION OF METHACRYLIC ACID ESTERS

Five years ago research at Du Pont revealed a new polymerization reaction 'Group Transfer Polymerization' of Methacrylic Acid Esters and the α-activated olefins. This reaction yielded a living polymer with immense potential for synthesizing new macromolecules. It now appears that living anionic polymerization of α-activated olefins is more the rule than the exception.

M.T. Reetz in Angew Chem International has recently reviewed metal free anionic polymerization of acrylate esters using the classical Micael addition reaction of anions of α,β-unsaturated esters. Tetra-n-butyl ammonium salts of mercaptane, thiophenols or carbon acids such as malonic acid derivatives are effective initiators at room temperature. Polymerization shows 'living' character S. Inocie reports that methyl methacrylate can be polymerised by tetraphenyl prophinato aluminium methyl in the presence of light at 420 nm to a high molecular weight and narrow molecular weight distribution polymer. These new polymerization techniques will lead to a resurgence of new polymer structures based on acrylic acid esters as monomers. (*Angew Chem Intl Ed. Engl.* 1988, 27 (7), 994) (*Polym Preprints* 1988, 29 (2)), (*Chemtech*, 11/1989, p. 645).

AN UPDATE ON ORGANIC POLYMERS IN OPTOELECTRONICS

The world market for optoelectronics is expected to reach $ 66 billion by 1992 according to Industrial Liaison Bureau, (Princeton, NJ) USA. The firm forecasts organic polymers and speciality chemicals will account for $ 3 billion to $ 3.5 billion and inorganic $ 2 billion. Fluoro acrylates, organic dyes, photoconductors and liquid crystalline polymers should all post at least 25% annual growth.

The firm defines optoelectronics as all elements of a system in which light collects, transmits, manipulates, presents or stores data. Optical fibres are already making sizeable inroads into long distance communications. The Integrated Systems Digital Network can only use fibre optics, but shorter range transmissions will, favour polymeric optical fibres.

The firm sees many opportunities for technological innovation. Adding floor to core acrylate optical polymers improves transparency and raises oper-

ating temperatures, the firm reports. Copolymers and terpolymers of vinylidene fluoride, tetra fluoro ethylene and chloro-trifluoroethylene are being studied for cladding, but poly fluoroalkylacrylates offer better crystallinity. Comonomers such as acrylic acid and glycidyl methacrylate are being studied to improve adhesions.

Basic research is being conducted in signal processing in USA and elsewhere. The electro optical effects on polymers depending on second-order non linear susceptibility have been studied in polar ordered data systems. Opto-electronic effects depending on the third order non linear susceptibility are being studied in polymers having long conjugated electron systems, with axial orientation.

The polycarbonate compact disc remains the most prominent example of optical storage. Research on polymethylmethacrylate derived systems for video discs has reduced warping caused by hydroscopy, but polymers for erasable optical discs still require greater sophistication. (*CMR*, 10/30/89, p. 24).

A NEW CLASS OF INORGANIC - ORGANIC POLYMERS UNVEILED

A new class of inorganic and organic macromolecules called Poly (Carbophosphazenes) has been found by Ian Manners and Harry Allcock of Pennsylvania State University and Gerhard Renner and Osdai Nuyken of the University of Beyrouth (W. Germany).

The polymers are made by ring opening polymerization of cyclo carbophosphazenes six membered rings with one carbon, two phosphorus and three nitrogen atoms. Chlorine substituents on the ring are incorporated in the polymer, where they serve as substitution sites. The macromolecules produced directly from ring-opening polymerization is sensitive to moisture but further reaction with sodium phenoxide or aniline yields hydrolytically stable derivatives in which aryloxy or arylamino groups replace the chlorines.

The derivatives take the form of films or glasses and superficially resemble organic polymers. 'In principle' say the scientists 'a broad range of polymers of this type should be accessible via replacement of the chlorine atoms of the reactive macromolecular intermediates by other nucleophiles. (*C & EN*, 7/24/89, p. 22).

MONTEDISON UNVEILS ECO-PLASTICS

Montedison researchers have recently unveiled a range of advanced 'ecological plastics' (Eco-plastics) which will soon be ready for industrial production and commercialization.

The first in the range is a multi-purpose plastic capable of exhibiting various characteristics and performances such as rigidity or flexibility, according to end-use. As an example the company states it will soon be possible to replace the broad array of plastic materials currently used in automobile dashboards with a single plastic appropriately processed. 'There will be tremendous ecological advantages' reports a company spokesman, 'since the wide variety of plastics on the market has been one of the biggest constraints on recyclability of stoictural plastics.

A second material, intended for agricultural use, consists of a plastic film to shield crops from severe cold. These plastics films are reported to be completely different in that they have the ability to absorb solar radiation. The new material is produced from agricultural raw materials and is said to be biodegradable.

The researchers have also developed new plastic packagings for food claimed to allow a reduction in the use of preservatives in foods. The packaging contains antifungal components to absorb oxygen thus preventing the food fr oxidizing. (*ECN*, 1/8/1990, p. 24).

A NEW ECONOMICAL PROCE FOR SMOKESTACK SCRUBBE ON THE HORIZON IN USA

Lawrence Berkeley Laborat (LBL) researchers have developed w could be an economical and effici process for scrubbing SO_2 amd N from smokestack emissions. Decreas the output of these pollutants could e the problem of acid rain and lu damaging ozone in the lower atm phere.

The LBL process discovered research team headed by Shih- Chang, removes 90 per cent of SO_2 upto 100 per cent of NO_x. The h system currently used in Europe Japan, removes up to 90 per cent these pollutants. However, that proc is expensive and, unlike the L method, requires separate systems SO_2 and NO_x.

The Chang process modifies standard limestone slurry scrubber adding yellow phosphorus, often s glown in the reactor. Limest removes SO_2, whereas the yel phosphorus eliminates NO_x. I products of the LBL treatment incl commercially valuable products suc the phosphoric acid, ammonium ph phate and gypsum.

On the other hand, the high efficie scrubbers in Japan and Europe rem NO_x by selective catalytic reduct which reduces the oxides to ammo at high temperatures. Costs for selec catalytic reduction run as low as $ 2 per ton of NO_x eliminated. In com rison, the LBL process is estimate cost as little as $ 1300 per ton eacl NO_x and SO_2 removed. A typical MW fossil fuel plant discha 300-400 tons of SO_2 and NO_x d Tests of scaled-up version of the r scrubber process are now under w (*Anal Chem*, 1/1/90, p. 16A)

ADIAN BANK NOTES LOIT OPTICAL INTERFER-E OF THIN FILMS TO FOIL COUNTERFEITERS

e Bank of Canada has issued a $50 bank note that contains a e optical security device based on echnology of thin films. The dians claim that they have pro- a sturdier, and cheaper bill than ti-counterfeit notes that Austral- ntroduced in 1988. Banking offi- n Britain and USA have expressed st in the technique.

e Canadian paper money will now e a small patch looking like a ho- n in the upper left hand corner of ll. Anyone handling the notes can they are genuine by tilting them. colour shifts from gold to green, ice versa, it is the 'real thing', s the developer of the device, Dobrovolski, of the Canadian nal Research Council.

hough the new device looks like gram, it is based on the optical erence effects of thin films, ns Dobrowolski. It is the same menon that produces the shiny d reflections on soap bubbles, oil or the wings of butterflies and s — surfaces that are smooth and ly reflective. By contrast, the opti- fect of a hologram is generated as reflects off a series of very fine embedded on its surface or in its The colour and intensity of light ted by a thin film device is deter- by the composition, number and ss of layers that form the patch. anadians device is composed of alternating layers of zirconium and silicon oxide. Each layer is ly 500 nanometers thick, about of the diameter of a human hair.

device is applied to the currency cisely controlled steps, first, the of zirconium and silicon oxide are ited in a vacuum onto a plastic webbing. Next the patches of thin film are transferred under pressure to newly printed bank notes. An adhesive secures them to the paper currency. The procedure raises the cost of producing the notes by 2.5 Canadian cents. According to John Rolfe, the Bank of Canada's scientific adviser, tests indicate that the optical effect, still occurs after bills have been crumpled, scratched, laundered, dry-cleaned and treated with chemicals. It is expected that the device will last the lifetime of the bank note, about three-and a half years. By contrast, holograms are not effective once the bill has been crumpled. Further, according to Debrovolski, thin film devices are far more difficult to counterfeit than holograms.

The Bank of Canada plans to replace all its existing bills with new ones bearing the devices between now and 1992 A.D. (*New Sc.*, 12/16/89, p. 22).

DEVELOPMENT OF XENON CHEMISTRY SPAWNS NEW APPLICATIONS FOR INERT XENON GAS

A chemically inert rare gas xenon that makes up only about a millionth of a per cent of the Earth's atmosphere is surprising the research chemists in recent years. In the early 1980s Martin Poliakoff of Nottingham University first used xenon as a solvent at low temperatures. Recently, Poliakoff and Michel Healey used supercritical xenon at a temperature above 16.9°C, when it is a 'supercritical fluid' with the properties of both liquid and a gas. They have developed a new analytical method based on supercritical xenon in conjunction with Perkin Elmer Company. Using the new solvent, they have analysed the tar-like deposits which form when coal and oil are burnt. They were able to separate the tar into its components and identify tiny traces of polycyclic hydrocarbons by analysing the characteristic pattern of the infra-red light that they emit. Although these compounds are known to trigger cancer, they are very difficult to monitor in the environment.

Xenon (supercritical) is the ideal solvent for both chromatography and IR spectroscopy because it is chemically inert and so cannot interfere with the compounds it is separating. Also, it cannot black out any part of the IR spectrum, because it has no chemical bonds to absorb this kind of radiation. Poliakaff's research group has also used supercritical xenon as a solvent for chemical reactions. This has enabled synthesize new and unexpectedly stable metal complexes of hydrogen or nitrogen gas. Xenon has the advantage over normal solvents that it will dissolve H_2 and N_2 very readily.

In one reaction, Poliakaff and his colleagues were able to replace a carbonyl of cyclopentadienyl rhemium tricarbonyl with two hydrogen atoms and in another they were able to displace one, two or all three carbonyls with N_2 molecules. Poliaoff found that such compounds of nitrogen are stable when made in supercritical xenon at room temperature. Previously, chemists thought they were highly unstable.

Other researchers have used liquid xenon below its critical temperature of 16.9°C. Robert Bergman and his colleagues at the University of California at Berkeley have found that liquid xenon is suitable for organic reactions. They performed a series of oxidative addition reactions in which a cyclopentadienyl iridium complex and an organic molecule react in liquid xenon when activated by UV light.

In the reaction, the organic molecule loses a hydrogen atom to the complex, while the rest of the molecule binds itself to the iridium. Chemists can then use the organometalic compound that forms to make other organic derivatives. The reaction works with organic compounds, as diverse as alkanes, naphthalene and alcohols. Further, German chemists have obtained structural details

of an organic xenon molecule. As early as 1967, Neil Bartleft showed that xenon was not the totally inert element that chemical theory demanded. Using fluorine gas, the most reactive of all elements, he made compounds such as XeF_2, XeF_4, XeF_6 and the Oxofluoride $XeOF_4$

According to current theory these compounds are possible because only fluorine and oxygen have a strong enough attraction for electrons to break into the perfect shelf of electrons which surround xenon and every other noble gas. Of the noble gases, helium, neon and argon still resist all atoms to make chemical bonds. Krypton and xenon will react, however.

The ultimate aim of xenon researchers has been to form a bond with carbon and so make the first organic xenon compound. Chemists have discounted earlier reports of Xe $(CF_3L)_2$, which would have such a bond, but in 1989 Dieter Naumant and Wisland Tyrra of the University of Dertmund achieved the goal, by reporting pentafluorophenylxenon fluoroborate. They just blackballed Herman Frohn and Stephanus Jakobus of Duisburg University, who made a very similar derivative, pentafluorophenyxenon pentafluorophenyltrifluoroborate.

However, Frohn and Jokobus were able to go one step better and grow crystals of their compound using the solvent acetonitrile. They have obtained its chemical structure by x-ray analysis. Their picture shows a xenon-carbon bond which is 2.092 Angstroms long. Surprisingly this chemical bond is shorter, and therefore, stronger than that between iodine and carbon. This refutes the widely held belief that organic xenon compounds would be intrinsically unstable if they were ever made. (*New Sc.*, 12/16/89, p. 20).

LASER-DRIVEN PROCESS DEVELOPED TO ETCH CHEMICALLY RESISTANT SURFACES

A new process for etching chemically resistant materials has been developed at Sandia National Laboratories that is believed to be faster and more flexible than the conventional methods. Sandia researchers developed the process to etch lithium niobate, a chemically inert substance used in optical waveguide switches. Such devices, connected to optical fibres, redirect and modulate light waves.

This is the first application of a laser driven chemical fusion reaction to etch a substrate, and it could be adapted for use on other inert materials. The process involves coating the lithium niobate substrate with powered potassium fluoride and then directing laser pulses onto the area to be etched. The hea sufficient to melt the lithium niob permitting the two substances to ch ically react and form a non-toxic w soluble solid containing niobate c fluoride anions. Because the untre area of the lithium niobate rem insoluble, etching is accomplishec simply rinsing the irradiated, sol area from the substrate with water. researchers have demonstrated the p ciple of the new method, but they h not used it for device fabrication.

Current techniques for making h and grooves in substrates — eithe ion etching or ion beam milling — much slower than the technique. E ing rates in excess of 10 microns/ were achieved compared to rate approximately 0.01 to 0.05 micr min.

Although mechanical techniques as ultrasonic impact grinding are as as the laser-driven approach, they limited in indentation of at least a limeter in width. The lateral resolu of the laser driven fusion process ha been determined experimentally, b is expected to be in the order of the sport size approximately 1 micron or slightly less. (For further inform contact Sandia National Lab, De ment 6110, Alluquerque NM 8 USA. (*Chem Eng. Prog.* 11/198 86).

Bleaching of non-edible oils, soaps and fatty acids with hydrogen peroxide

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roduction

Most of the non-edible oils like neem, karanja, rice bran are highly coloured and have an undesirable odour (1). they can be used for soap making after reducing the our and odour. These oils are first partially hydrogenated ore soap making, because the elimination of some unsat-ion hardens the stock and improves its odour as well as ility. Saponification is also faster when the unsaturation ess (1). Colour of these crude non-edible oils can be oved by two methods: (i) Physical method (ii) Chemical hod.

n physical method of colour reduction, oil is treated either activated carbon or activated earth and then filtered to clear oil with reduced colour (2). However, some dark urs are not removed by physical methods, where chem- methods are used for the removal of colour. In physical hod of colour removal there is a loss of oil also during ation and the process is time consuming. In chemical hod, the oil can be bleached with hydrogen peroxide, um chlorate, sodium chlorite or other bleaching agents.

process was developed at our Research Centre to bleach e non-edible oils with hydrogen peroxide. The bleached howed considerable improvement in colour as compared at of crude oil. The bleaching effect of hydrogen per-e was compared with other bleaching agents like sodium rate and sodium chlorite. It was observed from various riments that hydrogen peroxide is a superior bleaching t as far as cost, convenience and safety is considered. bran oil and neem oil were selected for bleaching stu- as model oils because they are used for soap making large scale and they are highly coloured in crude stage. r minor oils like neem, karanja, undi, maroti, salseed etc. lso be bleached with hydrogen peroxide in a similar way.

ty acids are produced in large quantities in India by split- of vegetable oils. Because they are highly coloured at rude stage, they are generally distilled for manufacture ite or very light coloured purified grades. Sometimes ber of distillations are required to get the desired quality product. This distillation procedure is time consum- nd expensive.

veral experiments were carried out in the laboratory and ber of commercial trials were taken on the bleaching ude fatty acids with hydrogen peroxide. It has been observed that the colour of the undistilled fatty acids can be improved significantly after bleaching with H_2O_2 and peroxide bleached fatty acids when distilled once afford products equivalent to double-distilled grades of fatty acids making the purification process economical.

Hydrogen peroxide can also be used for bleaching of soap during the saponification process. Excellent bleaching effect is observed when hydrogen peroxide is used at a level of 0.5%. The soap bleached with hydrogen peroxide is superior in colour and appearance as compared to other bleaching agents. The soap making process in which hydrogen peroxide is incorporated for improvement of colour and appearance of soap is described in the experimental section.

Experimental work

The chemical bleaching of crude oils was carried out in the laboratory at two stages, i.e. oil stage and after hydrogenation of oil. The details of the procedures of the laboratory bleaching with H_2O_2 and other bleaching agents are given in the Annexure 1.

Several commercial trials were taken for bleaching of rice bran oil (RBO) and neem oil in leading soap factories and the bleaching procedures to be followed at the shop floor, are given in Annexure 2.

Several commercial trials have been carried out for bleaching of soap in the soap kettle and also in the crutcher at several places, and the commercial procedure is described in Annexure 3.

The commercial process for bleaching of crude fatty acids is described in Annexure 4.

Analytical methods

Analytical methods related to residual bleaching agents in the oil, peroxide value, acid value, iodine value and colour measurement are given in Annexure 5.

Results and discussions

Bleaching of oils

Properties of RBO and hydrogenated rice bran oil (HRBO) before and after bleaching are given in Table 1 and Table 2 respectively. In case of RBO, colour reduction was 50% with hydrogen peroxide as compared to 36% only with sodium chlorate at 3% concentration of each bleaching agent,

whereas colour reduction of 43% was obtained at 0.9% concentration of sodium chlorite. Considering the cost of the bleaching agents (as mentioned in Table 3), it can be concluded that H_2O_2 at 3% concentration is superior to other two bleaching agents. It is to be noted from the results given in Table 1 and Table 2 that at 3% concentration of hydrogen peroxide, there was no change in iodine value and acid value of RBO after bleaching. However, as expected, there was some increase in peroxide value of oil after bleaching with 3% H_2O_2, but soap made out of this bleached oil having higher peroxide value does not show any residual peroxide value after saponification stage.

In case of HRBO, colour reduction of 40% was obtained by using 3% H_2O_2, whereas it was only 18% in case of sodium chlorate at same concentration. In case of sodium chlorite maximum colour reduction was 25% at 0.9% concentration. Higher colour reduction of oil can be obtained with higher concentration of sodium chlorite. But this will add to the cost of bleaching significantly and this is not acceptable to the soap makers. As evident from the results given in Table 3, H_2O_2 is the most cost effective bleaching agent for HRBO among the three bleaching agents studied. At 3% concentration of H_2O_2, there was no change in iodine value and acid value of HRBO and this is also true for sodium chlorate and sodium chlorite. Results on bleaching of neem oil in the laboratory are given in Table 4. It can be seen from Table 4 that beyond 2% H_2O_2 concentration the improvement in colour reduction is marginal. Therefore, in commercial trials only 1 to 1.5% of 50% H_2O_2 was taken on the weight of the oil. It has been observed in commercial trials that depending upon the initial colour of neem oil, around 30% colour reduction can be achieved. In fact, the colour reduction at this stage improves the colour of soap significantly.

Peroxide value in oil is important for storage of oils because with higher peroxide value deterioration of oil is faster (2). This point has been investigated with great care while bleaching RBO, HRBO and neem oil, which are used for soap making. As mentioned above, there is some increase in peroxide value in RBO and neem oil and very slight increase is noticed in HRBO. If a brine wash is given to oil after bleaching, the peroxide value can be brought down almost to the original value in case of neem oil and HRBO. However, the brine wash reduces the peroxide value of RBO to a great extent. Anyway, when these oils are converted to soap, peroxide value drops to zero, at the first stage of soap making irrespective of residual peroxide in oil.

B. Bleaching of soaps

The usage of H_2O_2 at different stages during soap making makes very little difference in its bleaching effect. However, it is used most conveniently after the third change in the kettle process, because at this stage considerable colouring bo are already removed with the mother liquor and washi H_2O_2 at this stage is used most effectively for removal o sidual colour in the soap. The slightly alkaline nature of soap is also beneficial for effective decomposition of pero

The bleaching effect is directly proportional to the c centration of H_2O_2 used for soap bleaching. Mode bleaching effect is observed at 0.5% concentration of H As mentioned in the experimental section, proper care to be taken during addition of H_2O_2 to avoid exces foaming in the kettle. Same thing is true in case of bleaci of soap in the crutcher.

C. Bleaching of fatty acids

The optimum concentration for bleaching of crude acids lies between 0.5 to 1.0% depending upon the ir colour of fatty acid.

Advantages of peroxide bleaching process

There are several advantages in any bleaching process ried out with H_2O_2. Some of them are listed below:

1. H_2O_2 decomposition products are water and oxygen therefore, there will be no effluent or pollution prob In case of sodium chlorate and sodium chlorite, the r ual chlorine may cause skin irritation and pose effl corrosion and pollution problems.
2. In case of oil, no filtration is required after bleachir compared to bleaching with activated earth and, there there will be no material loss.
3. Appearance and colour of bleached soap improves nificantly, therefore, the quantity of expensive addi like colouring matter, TiO_2 etc. can be reduced in p ide bleached soaps.
4. Particularly, in case of bleaching of neem oil, repu garlic odour is reduced significantly after peroxide bl ing.
5. Peroxide bleaching process definitely reduces the c bleaching related to colour improvement as compa other bleaching agents.
6. Soap bleached with H_2O_2 gives better shine and ap ance. This will have definite impact on consumer a and will be particularly advantageous in high value o mium soaps.

Commercial trials and adaptation by the industry

Several commercial trials were carried out for blea of oil (RBO and neem oil), HRBO, crude soap in the and crutcher and crude fatty acids. The processes for bl ing of oils, soaps and fatty acids given in these experim sections have been adopted by many leading manufac in our country with slight modifications as per their re ment.

is true to say that the peroxide bleaching of oils, soaps fatty acids have been established commercially and this been followed by many leading soap manufacturers.

ANNEXURE - 1
Methods of bleaching

Bleaching process with hydrogen peroxide

00 g of crude rice bran oil (RBO) or hydrogenated rice n oil (HRBO) was taken in a glass reactor and the reactor kept in a water bath at 70°C. 3 g of hydrogen peroxide % w/w) was added to the oil and it was stirred contin- sly with a mechanical stirrer. Foaming was observed and 70% volume of the glass reactor should be filled. After y one hour, 0.5 g of the sample was removed from the tor and it was analysed for percentage residual peroxide given in analytical methods). The bleaching process was inued until the percentage residual peroxide in the oil es to nil. This is generally achieved in two to three hours . The oil was kept under vacuum for removal of mois- and finally cooled to room temperature. The dry and clear vas then analysed for various properties like acid value, ne value, peroxide value, photometric colour, etc. (as n in analytical methods).

leaching process with sodium chlorate

0 g of RBO or HRBO was taken in a 250 ml glass reac- nd the reactor was kept in water bath at 70°C. 1 g con- ated sulphuric acid (i.e. 1% on the weight of the oil) added to the oil and it was stirred continuously with a hanical stirrer. Sulphur dioxide was liberated separately glass reactor by adding concentrated hydrochloric acid -wise over sodium sulphite or sodium metabisulphite and then bubbled continously through the oil in the reactor. ired quantity of sodium chlorate (1g, 2g, 3g or 4g) was lved in 5ml of water in a small beaker and was added oil. Stirring was continued. The bleaching process was nued until the residual sodium chlorate (as given in ana- l methods) comes to nil. The bleaching process gen- takes around 2 hours time. The oil was kept under um for removal of moisture and finally cooled to room erature. The properties were determined by the usual ods.

eaching process with sodium chlorite

g of RBO or HRBO was taken in a 250ml glass reac- d it was kept in a water bath at 70°C. 1g concentrated uric acid (i.e. 1% on the weight of oil) was added to l and it was stirred continuously with a mechanical stir- equired quantity of sodium chlorite was dissolved in uantity of water and added to the oil. Stirring was con- l. The bleaching process was continued until the resid- dium chlorite in the oil comes to nil. This was checked noving 0.5 to 1.0 g of the oil sample and analysing for ntage residual sodium chlorite (as given in analytical methods). The bleaching process generally takes two hours time. The oil was kept under vacuum for removal of moisture and was finally cooled to room temperature. The dry and clear oil was then analysed for various properties.

4. Bleaching at oil stage

RBO was bleached with hydrogen peroxide 50% (w/w) and sodium chlorate by the above processes at concentrations of 1%, 2%, 3% and 4% on the weight of oil. It was also bleached with sodium chlorite at concentrations of 0.5%, 0.75% and 0.9%. Sodium chlorite was used at lower level because of economic reasons which have been discussed already. The bleached oil samples were analysed for acid value, iodine value and photometric colour. The bleached oils were converted to soap by the usual process and the peroxide value of the converted soap was determined. The results are given in Table 1.

5. Bleaching after partial hydrogenation of oil

The HRBO was bleached with hydrogen peroxide, sodium chlorate, and sodium chlorite in exactly a similar way as RBO. The concentrations of bleaching agents used were also the same. The results are given in Table 2.

ANNEXURE - 2

Bleaching of RBO, HRBO and neem oil with hydrogen peroxide

1. Bleaching of RBO or HRBO with hydrogen peroxide

a. Raw materials:
RBO or HRBO: 1000 Kg.
(50%) Hydrogen Peroxide: 10 to 20 Kg.

b. Process

1. Takes 1000 Kg. of oil in the reactor (Remarks - only 70-75% of the volume of the reactor should be filled with oil). 2. Start agitation. 3. Heat the reactor to 70°C. 4. Add 10 Kg. to 20 Kg. (50%) H_2O_2 slowly. (Remarks: H_2O_2 should be added slowly to avoid excessive foaming. Best bleaching effect is obtained when (50%) H_2O_2 is added directly. H_2O_2 addition time is usually 30 minutes). 5. Maintain temperature at 70°C for two hours. (Remarks: Residual H_2O_2 in the reactor is checked in every 30 minutes. Generally it comes to nil within two hours). 6. Apply vacuum at 70°C for dehydration, period - one hour. 7. Cool to room temperature with agitation. (Remarks: Depending on the initial colour of the rice bran oil, 50-60% colour reduction (spectrophotometric method) can be obtained.

2. Bleaching of neem oil with hydrogen peroxide

a. Raw materials:
Neem oil: 1000 Kg.
(50%) Hydrogen peroxide: 10 Kg. to 15 Kg.

b. Process

1. Take 1000 Kg. of oil in the reactor. (Remarks: only 70-75% of the volume of the reactor should be filled with oil). 2. Start agitation. 3. Heat the reactor to 60°C. 4. Add 10 Kg. to 15 Kg. (50%) H_2O_2 slowly. Remarks: a. H_2O_2 is taken depending on the initial colour of neem oil. More H_2O_2 is required for darker oil. b. H_2O_2 should be added slowly to avoid excessive foaming. c. H_2O_2 addition time is usually 30 minutes. d. Best bleaching effect is obtained when (50%) H_2O_2 is added directly without any dilution. 5. Maintain temperature at 60°C for two hours. Remarks: (Residual H_2O_2 in the reactor is checked in every 30 minutes. Generally it comes to nil within two hours). 6. Wash the oil with 200 Kg. brine solution at 60°C for 30 minutes. 7. Separate the brine layer after complete phase separation. (It might take 6 to 8 hours for complete layer separation).

ANNEXURE - 3

Bleaching of soap with hydrogen peroxide in the soap kettle and crutcher

a. Soap making process

1. Saponification/brine change

The fat charge and caustic lye are mixed together at the required concentration and heated to 90°C for 8 to 10 hours. The mother liquor after washing is removed for glycerine recovery.

2. Strong change

The soap mass is treated with more caustic to complete the saponification process.

3. Third change

The soap mass is boiled and washed with brine.

4. Bleaching with hydrogen peroxide

At the third change, considerable colour substances are removed. Further improvement in the colour of the soap is obtained by adding hydrogen peroxide. After the third change, the soap mass is heated to 80-85°C and hydrogen peroxide is added slowly over a period of 30 minutes, after dilution with water. The recommended dosage of hydrogen peroxide is usually 5 Kg. for 1 tonne of fat charge. Boiling operation is continued for one hour more.

It is to be noted here that there will be some foaming during hydrogen peroxide addition. It is, therefore, necessary to add hydrogen peroxide after dilution with water on the whole surface of the soap over a period of time and it should not be accumulated in one place. Proper care has to be taken during handling of hydrogen peroxide.

5. Fourth change

After bleaching with hydrogen peroxide, the soap mass is washed with brine solution.

6. Fitting

The soap mass is now ready for fitting operation.

B. Bleaching in the crutcher

If so desired, the bleaching of neat soap with hydro[gen] peroxide can be carried out in the crutcher instead of in kettle. The requirement of hydrogen peroxide is usually 3 to 5 Kg. for 1 tonne of neat soap. (50%) H_2O_2 shoul[d be] added very slowly at 70°C over a period of time to av[oid] excesive foaming. The total time of bleaching is one h[our]. The other additives, such as colour, fragrance, antioxi[dant] should be added after peroxide bleaching.

ANNEXURE - 4

Bleaching of fatty acids with hydrogen peroxide

a. Raw materials

Crude fatty acids: 1000 Kg.
(50%) Hydrogen peroxide: 10 to 20 Kg.

b. Process

1. Take 1000 Kg. of the crude fatty acid in the rea[ctor]. (Remarks: only 70-75% of the reactor should be filled. [2.] Heat the reactor to 70°C to melt the fatty acids. 3. Start [agi]tation. 4. Add 10 to 20 Kg. (50%) H_2O_2 slowly. (Rema[rks:] H_2O_2 should be added slowly to avoid excessive foam[ing.] Best bleaching effect is obtained when H_2O_2 is ad[ded] directly. H_2O_2 addition time is usually 30 minutes. 5. M[ain]tain temperature at 70°C for 1 hour. (Remarks: Resi[dual] H_2O_2 in the reactor is checked in every 30 minutes. G[en]erally it comes to nil in 30 minutes. 6. Apply vacuum at 7[0°C] for dehydration period - 1 hr. (Remarks: This operatio[n is] not essential. This is done if anhydrous product is requi[red]. 7. Cool to room temperature with agitation. (Rem[arks:] Depending upon the initial colour of the crude fatty a[cid] 40-50% colour reduction (spectrophotometric method) [can] be obtained.

ANNEXURE - 5

Analytical methods

1. Determination of percentage residual peroxide

About 2 g of the oil sample was taken in a conical [flask] after exact weighing and 50 ml (1:9) of sulphuric acid [was] added to it. It was shaken vigorously and 2 g of KI was a[dded] to it. It was then titrated against 0.1N sodium thiosul[phate] solution using starch indicator.

1ml of 0.1N thio = 0.001710 g of H_2O_2

2. Determination of percentage residual sodium chl[orate]

About 2 g of the oil sample was taken in a conical [flask] after exact weighing and 50 ml (1:9) of sulphuric acid [was] added to it. It was shaken vigorously and 2 g of KI was a[dded] to it. It was then titrated against 0.1N sodium thiosul[phate] solution using starch indicator.

1ml of 0.1N thio = 0.001775 g of sodium chlorat[e]

etermination of percentage residual sodium chlorite
he procedure is same as that of sodium chlorate above.
1ml of 0.1N thio = 0.002261 g of sodium chlorite

etermination of peroxide value
. Acetic acid chloroform solution was prepared by mixing rts by volume of glacial acetic acid with 2 parts by volume hloroform. b. Potassium iodide solution — saturated solu- of KI was prepared in recently boiled distilled water and ed in dark. c. 0.1N sodium thiosulphate solution was pre- d and accurately standardised. d. 1% starch indicator solu- was prepared in distilled water.

cedure
.0 g of sample was weighed in a 250ml glass stoppered nmeyer flask and then 30ml of the acetic acid chloro- n was added. The flask was shaken until the sample was olved in the solution. 0.5ml of saturated KI solution was ed. The solution was allowed to stand with occassional king for exactly one minute and then 30ml of distilled er was added. It was titrated with 0.1N sodium thiosul- te solution with constant shaking until the yellow colour almost disappeared. 0.5ml of starch solution was added l the blue colour had just disappeared. A blank titration he reagents was conducted. The blank titration must not eed 0.1 ml.

culation

$$\text{oxide value} = \frac{(S-B)\ (N) \times 1000}{\text{Weight of sample}}$$

ere B = Titration of blank
S = Titration of sample
N = Normality of sodium thiosulphate solution

olour measurement
he measurement of colour of oils and fats is carried out he following different methods (3): a. Comparison with dard colour solution like nickel sulphate, cobalt sulphate b. Colour measurement on Gardener scale. c. Colour surement by comparison with permanent glass standards .C. Method). d. Spectrophotometric determination of ur. e. Colour measurement by Lovibond tintometer.

all industrial applications, Lovibond tintometer is widely l for the measurement of colour of oils and fats because he ease of operation and quick results. However, this hod has got the following drawbacks: a. If the difference olours is not much, then this method will not give accur- results. b. Matching of colours for comparison varies from person to person. To overcome the above drawbacks, it was decided to use spectrophotometric method for the determination of colour.

Spectrophotometric method for colour measurement

1. The spectrophotometer was turned on and allowed to warm up for 30 mins. before standardising or making any measurements.
2. The wavelength dial was set to 460nm. The zero reading of the instrument was rechecked and cuvette filled with carbon tetrachloride (AR grade) was inserted in the instrument. 100% transmittance point was set exactly.
3. The cuvette was filled with sufficient amount of oil to insure a full column in the light beam. (Sample of oil must be absolutely dry and clear. Suspended material will cause light scattering. If the sample is not clear, filter it through a bed of sodium sulphate). 4. The filled cuvette was placed in the instrument and the absorbence reading was taken at 460, 550, 620 and 670 nm.

Calculation
Photometric colour

$$= 1.29\ A_{460} + 69.7\ A_{550} + 41.2\ A_{620} - 56.4\ A_{670}$$

Where A is the absorbance.

Note
For measuring colour of HRBO, 25 g of it was dissolved in 100 ml of carbon tetrachloride to get a clear solution. This clear solution was filled in the cuvette and the absorbance readings were taken at different wavelengths.

6. ***Determination of acid value***
AOCS method (3) was followed.

7. ***Determination of iodine value***
AOCS method (3) was followed.

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Acknowledgements

The authors thank the Management of National Peroxide Limited for permission to publish this paper. Cooperation and help of Dr. H.K. Holla, General Manager, Research of TOMCO is also gratefully acknowledged.

Table 1
Properties of rice bran oil

Sample	Photometric Colour	% Reduction in Colour	Acid Value	Iodine Value	Peroxide Va after soap making
Crude	79.3	-	84.1	124.1	Nil
Bleached with:					
a. H_2O_2 1.0%	63.3	20.2	84.1	124.1	Nil
2.0%	52.7	33.6	84.1	124.6	Nil
3.0%	39.5	50.1	84.1	125.6	Nil
4.0%	38.1	51.9	84.1	125.0	Nil
b. $NaClO_3$ 1.0%	63.4	20.0	85.5	124.0	Nil
2.0%	54.7	31.0	86.0	123.5	Nil
3.0%	50.4	36.4	86.0	124.0	Nil
4.0%	42.2	46.7	86.0	123.2	Nil
c. $NaClO_2$ 0.6%	55.5	30.0	84.1	124.1	Nil
0.75%	49.9	37.0	84.1	124.9	Nil
0.9%	44.6	43.6	84.1	123.3	Nil

H_2O_2 - Hydrogen Peroxide (50% w/w)
$NaClO_3$ - Sodium Chlorate (100% pure)
$NaClO_2$ - Sodium Chlorite (80% pure)

Table 2
Properties of hydrogenated rice bran oil

Sample	Photometric Colour	% Reduction in Colour	Acid Value	Iodine Value	Peroxide Va after soap making
Crude	218.8	-	80.1	73.5	Nil
Bleached with:					
a. H_2O_2 1.0%	176.2	19.4	80.0	73.2	Nil
2.0%	145.1	33.6	80.1	73.1	Nil
3.0%	132.0	39.6	80.1	73.7	Nil
4.0%	116.3	46.8	80.0	72.9	Nil
b. $NaClO_3$ 1.0%	218.1	Nil	80.5	73.0	Nil
2.0%	201.3	8.0	80.0	72.9	Nil
3.0%	179.4	18.0	80.0	72.9	Nil
4.0%	146.6	33.0	81.0	73.1	Nil
c. $NaClO_2$ 0.6%	189.4	13.4	80.5	73.5	Nil
0.75%	178.8	18.2	80.1	73.5	Nil
0.9%	164.7	24.7	80.5	73.9	Nil

Table 3
Cost analysis of bleaching agents for RBO and HRBO

ching nt used ncentration)	* Price of Bleaching agent per Kg. Rs.	Concentration of Bleaching agent required %	Qty. of bleaching agent per Kg. of oil (gms)	Cost of bleaching per Kg. of oil (Rs.)	Optimum Colour Reduction Obtained (%) RBO	HRBO
$_2$ (50% w/w)	28	3	30	0.84	50.2	39.7
IO_3 (100%)	28	3	30	0.84	36.5	18.0
IO_2 (80%)	88	0.9	9	0.79	43.7	25.0

ese prices are quoted in Chemical Weekly - December 1989.

Table 4
Properties of neem oil

nple	Photometric Colour	% Reduction in Colour	Peroxide Value After Soap Making
de	162	-	Nil
ached with H_2O_2 1%	119.8	26	Nil
2%	113.4	30	Nil
3%	102	37	Nil

Quality Control

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ng of quality control

word quality control comprises of two words i.e., qual- control. It would be better to explain these words sep- to understand the clear meaning of quality control. words of Dr. W.R. Spriegel, "The quality of a pro- ay be defined as the sum of a number of related char- tics such as shape, dimension, composition, strength, anship, adjustment, finish and colour".

ording to John of D. Mclellan, "Quality is the degree ch a product conforms to specifications and work- p standards". From the above mentioned definitions ear that quality refers to various characteristics of a and their excellence. Quality is a relative term and absolute depending upon the use of the product and stances under which it is used.

chieve and maintain a satisfactory level of quality of s is a very tough task. It involves many problems to ed. Firstly, product must possess a minimum level ity so that it could be easily sold in the market. y, in order to measure quality, accurate standard mea- nts must be established. Thirdly, reasonable deviation edetermined standards must be determined. Finally, ory level of quality must be achieved with a min- ost.

ol refers to the use of all the ways and means whereby tandards could be maintained. Control precisely aims ng the product up to predetermined standards by ng deviations from established and pre set standards. ng to Benri Fayol, "Control consists in verifying everything occurs in conformity with the plan the instructions issued and principles established. r object to point out weakness and errors in order them and prevent recurrence. It operates on every- things, people, actions". This definition gives the of control in a very clear and lucid manner. The control is wider, including not only product to be but also extending to workmen and their methods ions. In the absence of effective control over pro- perations, desired quality in the products to be pro- nnot be achieved. As such the words quality and annot be studied separately in this context but as ontrol'.

control is concerned with the control of quality oduct during the process of production. It aims at achieving the predetermined level of quality of the product. Some important definitions of quality control may be enumerated here.

"Quality control may be defined as that industrial management technique or group of techniques by means of which products of uniform acceptable quality are manufactured. It is indeed the mechanism by which products are made to measure up to specifications determined from customer's demand and transformed into sales, engineering and manufacturing requirements. It is concerned with making things right rather than the discovering and rejecting those made wrong".

-- Alford and Beatty.

"Quality control means the recognition and removal of identifiable causes and defects, and variations from the set standards".

-- J.A. Shubin

"Quality control is used to connote all those activities which are directed for defining, controlling and maintaining quality".

-- K.G. Lockyer

"Quality control is systematic control by management of the variables in the manufacturing process that affect goodness of the end-product".

-- H.N. Broom

"Quality control is the systematic control of those variables in the manufacturing process which affect the excellence of the end product. These variables, result from the application of materials, men, machines, and manufacturing conditions. The production system possesses these inputs to produce desirable outputs. Only where the variables in the inputs are regulated to the extent that they do not deviate unnecessarily from the excellence of the manufacturing process as reflected in the quality of finished product can the control of quality be said to exist".

-- Bethe, Atwater and Stackman

Objectives of quality control

1. To establish the desired quality standards which are acceptable to the customers and economical to achieve.
2. To discover flaws or variations in the raw materials and the manufacturing processes in order to ensure smooth and uninterrupted production.
3. To evaluate the methods and processes of production and suggest further improvements in their functioning.

4. To study and determine the extent of quality deviation in a product during the manufacturing process.
5. To analyse in detail the cause responsible for such deviation.
6. To undertake such steps which are helpful in achieving the desired quality of the product.

Functions of quality control

Important functions performed by quality control are:

1. It enumerates requirements of the factory.
2. It predetermines standards for raw material, process and the product to be produced.
3. It compares the end product with predetermined standards and variation if any is worked out.
4. It determines sampling limits and control.
5. It introduces proper and effective system of production control by undertaking effective inspection.
6. It records, summarises, interprets and presents data available and used for its implementation.
7. It introduces the system of statistical quality control.
8. It develops new and economical quality control procedures.

In the words of John D. Mclellan, "Quality control develops plans for inspection, analyses reports from inspection, establishes patterns for sampling control and acceptance and keeps the production department informed about the defects".

Benefits of quality control

Benefits derived from an effective quality control are as follows:

1. **Encourages quality consciousness.** The most important advantage derived by introducing quality control is that it develops and encourages quality consciousness among the workers in the factory which is greatly helpful in achieving desired level of quality in the product.

2. **Satisfaction of consumers.** Consumers get better quality products on account of quality control. It gives them satisfaction.

3. **Reduction in production costs.** By undertaking effective inspection and control over production processes and operation, production costs considerably reduce. Quality control further checks the production of inferior products and wastage thereby bringing down the cost of production.

4. **Most effective utilisation of resources.** Quality control ensures maximum utilisation of available resources.

5. **Reduction in inspection costs.** Quality control brings about economies in inspection and considerably reduces inspection costs.

6. **Increased goodwill.** By producing better quality products and satisfying customer's needs, quality control raises the reputation of concern in the minds of people.

7. **Higher morale of employees.** An effective sys quality control is greatly helpful in increasing the mo the employees. They feel that they are working in th cern producing higher quality products.

8. **Improved employer employee relations.** Quali trol develops better industrial atmosphere by inc morale of employees and initiating a sense of belongi among them thereby ensuring harmonious en employee relations.

9. **Improved techniques and methods of producti** supplying technical and engineering data for the prod manufacturing process, improved methods and des production are ensured by quality control.

10. **Effective advertisement.** Organisations pr quality products have effective advertisement. Thi account of achieving public confidence by supplyir better quality products.

11. **Facilitates price fixation.** By introducing qua trol measures, uniform products of same quality are pr This greatly facilitates the problem of price fixation. O of standard products is prevalent in the market.

12. **Increased sales.** Last but not the least benef can be derived from an effective system of quality is that it increases the volume of sales on account c quality products.

Methods of quality control

There are two main methods of initiating quality These are discussed as follows:

1. **Inspection.** Inspection is concerned with measu evaluating the qualities and attributes of a product o on the basis of predetermined standards. It is an i component of the process of production control. T ally, inspection was concerned with sorting out g ducts from the total lot and separating the bad on its scope has widened in the modern times. In the Kimball and Kimball Jr., "Inspection is the art of ing materials, product or performance with establis dards".

Objects of inspection

Various objectives of inspection are:

1. To separate proper quality or useable raw mate defective raw material of work-in-progress. Thi red to a remedial inspection.
2. To help in finding and evaluating the causes re

defective work and to be further helpful in eradicating ch causes. This is known as preventive inspection.
check and control the quality standards of production ocess. This is called operative inspection.
prepare reports for submitting to the management with gard to quality of the raw material, the product produced d efficiency of various manufacturing operations.

ods of inspection.
rious methods of undertaking inspection are:

Remedial and preventive inspection. As has already pointed out while discussing the objects of inspection emedial inspection is concerned with sorting out right of raw material from undesirable and defective one. Preve inspection studies various causes responsible for tive work and suggest ways and means to overcome causes.

Centralised and floor inspection. Inspection may be d at specified points or central points in the organisa- For carrying out this type of inspection, material and things are to be carried to these inspection centres. It y saves the time of inspection as they need not move one place to the other for carrying on inspection in the y.

or inspection is just the reverse of centralised inspec- Under this method the supervisors have to move from roduction process to another in order to carry inspec- This type of inspection is carried at the place or near where product is being produced. This method ensures and effective inspection by providing timely inspec- the time of production. This minimises the occurrence ects in the product. The main drawback of this method it is time consuming. A supervisor has to move from ob to another for undertaking this inspection. That is t is also referred to as patrolling inspection.

nspection relating to raw material, work in progress inished product. As the very name suggests, this d relates to inspection of raw materials purchased for ction. Raw materials constitute the major proportion end products. The quality of raw material used ulti- y affects the quality of the finished product. Inspection material should be carried at different points in the y viz., at the factory gate and at the time of actual use. s also called incoming inspection.

ilarly, work-in-progress should be kept at minimum its accumulation should be avoided. Work-in-progress to semi-finished goods. This is also known as pro- spection. Kimball and Kimball rightly pointed out that n progress or process inspection is undertaken to ensure against the loss or deterioration of product while in transit from one process to another and to prevent unnecessary hard work on assembly floor. In order to achieve and maintain better quality products, handling of work in progress should be as less as possible.

Finished product inspection relates to thorough checking of the product after completion. Before the disbursement of the product, pre-shipment inspection is also undertaken. The main aim of carrying out such an inspection is to supply right type of products with desired quality to the consumers.

Statistical quality control

This is another important technique of quality control. Statistical quality control (SQC) refers to application of statistical tools to the problems of quality control. In the words of Alford and Beatty, "Statistical quality control (SQC) is the technique of applying statistical methods based upon the mathematical theory of probability to quality control problems, with the purpose of establishing quality standards and maintaining adherence to these standards in the most economical manner".

Techniques or tools of statistical quality control

There are two important techniques of applying statistical quality control viz., a. Quality control charts. b. Acceptance sampling. These can be explained as follows:

a. Quality control charts

A quality control chart is a graphic representation of the expected variations in quality. Certain presumptions are taken into consideration before drawings these charts e.g., inherent nature of certain variables in a production, tolerance limits are related with manufacturing of a product and probability of chance in variation cannot be ignored.

Tolerance limits are clearly shown by these charts with regard to a particular product. Variations in quality beyond these limits clearly disclose that the production process is out of control and the quality of the product has not been achieved in accordance with the predetermined standards. On the other hand, a process is said to be in control if the finished product remains within the tolerance limits. Quality control charts are very helpful in spotting the causes responsible for variations from the set standards on the basis of information disclosed by these charts. Different types of quality control charts may be used for recording different types of analysis. Some of the important quality control charts are chart of averages and that of range etc. Information revealed by these charts is very accurate and an authentic one.

b. Acceptance sampling

Another technique of statistical quality control is acceptance sampling. This is also referred as 'Sampling Inspec-

tion Plan'. Under this method, a sample of the product produced is selected at random to study in detail whether the product confirms to the predetermined standards or not. A limited percentage of defective products is allowed. But it has been observed that sometimes the sample selected turns out to be good one but the lot represented by the sample may be defective or substandard. In order to have more accurate and exact results, more than one sample of the product should be selected for carrying out the 'sampling inspection plan'.

The technique of acceptance sampling undertakes two limiting levels of quality viz., (i) the acceptable quality level (AQC) i.e., the least number or percentage of defective products that the buyer expects to purchase and the seller expects to sell and (ii) the lot percentage tolerance defective (LPTD) refers to that limit where the buyer wants to be certain about the rejection of the lot.

Advantages of statistical quality control

Following are the important benefits derived from the technique of statistical quality control.

1. **Lesser cost of inspection.** Statistical quality control is based on sampling technique which involves lesser c inspection thereby cost production is considerably rec

2. **Increase in profits.** By minimising rejections, s ical quality control ensures the production of standar ducts which bring higher profits for the producer.

3. **Setting tolerance limits.** Quality control charts c lay down the 'tolerance limits' beyond which the proc to be rejected. The results shown by these charts are authentic and correct.

4. **Develops quality consciousness.** Statistical qualit trol is greatly helpful in developing the feeling of qualit sciousness among the workers working in an organis This improves their functioning and reduces the num defective operations undertaken by them.

5. **Enhances reputation of the concern.** By adopti techniques of statistical quality control, predetermined ity of the product is achieved and consumers get desired ity products. This brings good name to the firm and inc its goodwill among the people.

Food & Pharmaceutical Technology in Perspective - 1

ILK FOR LACTOSE INTOLER- NCE MAKES A DEBUT IN ANADA

A two percent special milk called cteeze has been recently launched in nada's four western provinces for rsons who cannot drink ordinary milk e to lactose intolerance. Lacteeze is least 90% lactose reduced and offers unrefrigerated shelf-life of four nths. The product can also be used a substitute for fluid or powdered lk in cooking and baking applica- ns. It costs around $1.49 per litre and sold in Tetra Brik Aseptic cartons.

For further information contact: Dairy ducers Cooperative, Regina, Sas- chewan, Canada.

ODEGRADABLE PACKAGING LM DEVELOPED IN USA BY EXEL INC

The rising packaging waste in USA spurred the search for biodegradable kaging film. Discarded packaging, as er and garbage, is one of the most ceable problems in global waste col- ion. These pressures for degradable kaging have motivated Flexel Inc, a ling cellophase manufacturer of A, to announce an alternative pack- ng material, which meets the grow- demand. The alternative cellulose is known as Cellophane. Cellulose is made from a renewable resource, d pulp. Cellulose film is environ- ntally degradable i.e. biodegradable. an be also composted for use as a lizer in agricultural applications and also be safely incinerated. (*Food g. Intl.*, 9/1989, p.79).

UID ROASTING OF COCOA ANS ON THE HORIZON

n the international level, various techniques have recently been discussed to determine the most effective means of roasting cocoa. Carle & Montanari (C & M) Co. of Italy believes that the path of the future, for cocoa lies in liquid roasting.

In general, the process of roasting consists of the formation of the aromatic fraction of cocoa, through activation of chemical reactions and physical phenomena. In non-liquid roasting, a continuous development of steam leads to an uncontrolled loss of some of the already formed aromatic substances. This is why C & M considers liquid roasting more beneficial for cocoa manufacturers.

Because the presence of a great amount of humanity prevents the formation of pyrazine derivatives, it is important that the roasting process be preceeded by a suitable drying phase at limited temperatures. (Max. 100°C).

Adopting the process of liquid roasting technology involves obtaining raw masses, that is to say, unroasted cocoa which has just been dried and still contains at least 4-5% humidity.

In order for the aromatic fraction of cocoa to properly develop to the required level, it is necessary that the roasting process occurs under conditions which are as precise and repeatable as possible (partiularly in regard to the roasting time). Respecting these conditions ensures optional roasting. For this reason C & M has chosen the system of mass batch cocoa treatment, permitting precision adjustment of the process parameters at any time'. With C & M's MAP/cc mills using computerized control, all of the mass is homogenously submitted to the same heat conditions. For further information contact Carle & Montanarium Milan, Italy. (*Inst. Eng. Intl.*, 9/1989, p. 79).

NESTLE'S WORLD'S LARGEST ICE CREAM PLANT INAUGURATED IN USA

In October '88 Carnation Company (a subsidiary of Nestle, Switzerland) inaugurated its new $ 80 million, 20903 m^2 icecream and frozen novelty plant on a 12.1 hectare site in Kern Country, California, USA. This world's largest ice cream plant can produce 132.5 million litres of ice cream and frozen novelties per year to meet the surging demand. The plant was built in just 2 years as a fast-track, twin key project.

This most modern ice cream plant is designed for straight forward product flow, continuous operation, production flexibility, tight sanitation, easy expansion and also to withstand the geological productivities of California. Being the world's largest ice cream plant it requires a vast range of ingredients.

Both fluid and dry dairy ingredients such as condensed whole milk, butter milk, skim milk, cream, butter and whey; sweetners such as sucrose, corn syrup and high fructose corn syrup (HFCS), coatings such as chocolate and cocoa powders etc. The plant will consume 181, 440 kgs. of strawberries and 272,160 kgs. of cookies and candies annually. (*Food Eng. Intl.*, 5/1989, p. 48).

JAPAN GOES FOR MORE STRINGENT REGULATIONS FOR CHEMICALS IN FOODS

Japan is drafting a new stronger set of regulations to control residues of potentially dangerous chemicals in imported food products. Officials at the Ministry of Health & Welfare said recently that a special panel now is researching the impact on humans of various pesticides and other chemical

residues in food and will draft its proposals for revising the regulations within the next three years. Japan has become one of the world's largest importers of agricultural products as international pressures has forced the opening of its markets in recent years. Japan imported 30% of its total grain and soybean requirements in 1988 —the highest level of any industrial nation.

The increase in imports has generated fears among consumers that pesticides, fungicides and other potentially harmful chemicals widely used in food production overseas may be a health hazard. Of particular concern is chemicals applied to foods after harvesting to keep them looking fresh. Japan already banned the sale of food containing residues of 18 of the 58 chemicals the US permits to be used on food after harvest. In the near future, the government may soon ban residues of other potentially harmful chemicals not used in Japan.

Such chemicals as Malathion, Fenitrothion and a few others are on the list of possible targets for banning. Malathion and Fenitrothion often are used by American wheat farmers, but a Japanese Zenchu (Centre Union of Agricultural Cooperatives) publication claimed last year that a survey has revealed monkeys suffer from deformities and blindness after eating food containing residues of these chemicals.

The Ministry has been checking every cargo of imported wheat arriving at Japanese ports during the past several years, but so far residues of such chemicals have been below the safety levels set by international organizations. (*Chem Eng. Prog.*, 11/1989, p. 12).

FDA APPROVED AN EFFECTIVE 'MORNING AFTER' PILL IN USA AS AN ORAL CONTRACEPTIVE

Four tablets of Ovral brand of norgestrel/ethynyl estrediol taken within 72 hours after intercourse usually prevent pregnancy, according to physician consultant of the Medical Letter. FDA has long approved the drug for marketing by Wyeth-Ayerst Laboratories as an oral contraceptive.

The consultants cite one study with a 0% failure rate, but report that other studies showed 0 to 7.4% failure rates with a pooled failure rate of 1.8%. Ovral thus seems a true 'morning after' pill, usable in the privacy of the home, in contrast with the much-talked of mifepristone (RU-486) of Groupe Roussel Yalaf, Paris, which fails in 40% of cases, unless followed 48 hours later by an injection or intravaginal suppository of a prostaglandin, which may only be given by a doctor. (*The Medical letter* 31, 93 (1989)) (*C & EN*, 11/6/89, p. 24).

WATERPROOF PAPER BAGS GETS PREFERENCE IN THE ENVIRONMENTALLY CONSCIOUS SWEDEN

The Sweden Pulp & Paper Association has launched a campaign to make Swedish food shoppers even more environmentally conscious - they are asked to start using carrier bags made of paper rather than plastic. The Association is aiming to improve the current type of paper bags by making them out of softer, more water resistant paper to make them convenient for waste collection.

The drive is part of a scheme to improve the environment, which also includes a number of actions in pulp and paper mills and waste incinerator plants to reduce dioxin emissions. So far the Association has spent some $ 35 million on research into emission control. The pulp and paper industry is Sweden's biggest export earner, holding a 19% share of total exports in 1987. The environment friendly paper carrier bags, which are now to be marketed internationally, are expected to become a popular 'green' addition to the range of export products. (*Sweden*, 10/1989)

A DIAGNOSTIC TEST FOR IRRADIATED FOODS ON THE HORIZON

Today one of the big stumbli blocks to the complete banning of ir diated foods or its acceptance is that easy way of detecting it has been ava able. Now a team of researchers at t North London Polytechnic claims have made a breakthrough in the sear for a diagnostic test for irradiated foo Researchers led by Dr. Martin Gro veld report that the recent research h indicated that gamma rays irradiati can result in the loss of essential nu ents including Vit C and E and can t Vit C into hydroascorbic acid, which toxic. There is also extensive evide of lipid peroxidation being caused irradiation. This involves the degra tion of polyunsaturated fatty aci which are present in a great ma modern food products, leading to rancid off-flavour.

Two types of diagnostic tests ha been investigated quantitatively, wh a statistically significant increase decrease in the concentration of che ical species is detected after irradiati or qualitative, when new chemical s cies not present in the untreated food detected after irradiation. Dr. Grovtv and his research team claim to h achieved their breakthrough with a qu itative test based on the effect of a matic hydroxylation. The test v require equipment already available most public analyst laboratories with additional electrochemical detect system costing around £3000.

The electrochemical system used the above research team produ chromatograms which reveal not o changed peaks indicating quantita changes, but also new peaks indica the presence of quantitative cha consistent with the sample having b irradiated. At present, no one kn how much irradiated foods have b sold in advanced countries of the wo

ecause so far there has been no way f proving it has been so treated. At the oment the only reason for irradiating od according to many authorities, is conceal contamination and parasites. herefore, a reliable and cheap way of etecting it should be of immense benfit both now and in future when the chnique of irradiation of foods will ecome more widely permitted round e world. (*Food Manuf.*, 5/1989, p. 3)

YSOZYME FINDS APPLICATION IN FOOD INDUSTRY

Many compounds found naturally in od have anti-microbial activity. The hallenge to researchers is to utilize em as preservatives without adversely ffecting the foods to which they are dded. Lysozyme is present in both milk nd eggs. Bovine milk contains about 3 mg of lysozyme/100 ml., while the nzyme accounts for about 3.5% of the ry weight of egg white.

Lysozyme is active against most ram positive bacteria, particularly ermophilic spore formers. Lysozyme s inhibitory to several food spoilage rganisms, including Listeria monocytgenes Campylobacter Jejuni, Salmoella typhimurium, Bacillus cereus and Clostridium botulinum.

Recently, the use of lysozyme has ained considerable interest for its pplication in the cheese industry, where can be used as a substitute for nitrate. n an article of the Dutch Dairy esearch Institute (NIZO) in VMT o. 10, 1987, the use of Lysoyme is explained to prevent butyric cid fermentation in Gonda Cheese. ysozyme has been also used in Parnesan Cheese (*Grazia et at. Scienz echnica Latteers Casearia* 35 *(Suppl)* 84-394).

Although lysozyme currently has limted application in food industry, it does ffer potential as a food preservative, ince it is specific for bacterial cell walls nd harmless to humans. (*Food Technol.* 1/1989, p. 134), (*Ibid* 6/1989, p. 32).

ELLAGIC ACID FROM FRUITS UNDER STUDY AS A NEW ANTI-CANCER AGENT

Ellagic acid is present in strawberries and apples. Twenty five pounds of strawberries contains only an ounce of ellagic acid. Ellagic acid also is contained in apples, blackberries, raspberries, blueberries, cranberries and grapes and various nuts. Researchers have known also that strawberry roots, leaves and fruit contains ellagic acid. It is reported that the natural acid found in fruits could be effective against certain chemical carcinogens. Dr. Gary Stoner of the Department of Pathology at the Medical College of Ohio has been studying the compound since 1984. According to Dr. Stoner ellagic acid prevent procarcinogens from breaking down and may also act as a trapping agent for carcinogenic metabolites.

Dr. Stoner reports that experimental evidence indicates that the acid keeps a hydrocarbon found in tobacco smoke and in the atmosphere (benzo (alpha pyrene) diol) from inducing skin and lung cancer in animals and genetic damage in cultured human lung cells. Purified ellagic acid, used clinically too blood-clotting time, appears to be effective against five classes of chemical carcinogens: (a) polycyclic carcinogens, (b) polycyclic aromatic hydrocarbons, (c) nitrosamines, (d) aflatoxins and (e) aromatic amines. It reduces aflatoxin-induced genetic damage in cultured human and rat lung tissue. Aflatoxin is a natural toxin found in moldy foods like corn and peanuts.

Ellagic acid also inhibits the ability of a nitrosamine (n-nitroso benzylmethylamine) found on moldy foods from causing esophageal cancer in rats and genetic damage in cultured human esophasus cells. Because of difficulty of getting adequate supplies of ellagic acid, the USDA scientists are working to increase the content of ellagic acid in strawberries (whose roots, leaves and fruit contain the acid). Researchers are now determining the genetics of the acid to find out how it is inherited so that they can breed plants for higher levels. Researchers at the Agricultural Research Service Fruit Laboratory (Beltsville, Md.) are testing several varieties of apples for ellagic acid content. (*CMR* 11/27/89, p.p. 9, 22)

NOVOLET - A NEW INSULIN INJECTION SYSTEMS FROM NOVO NORDISK

Novo Nordisk has introduced recently a new type of prefilled insulin syringe, NovoLet in the Netherlands. This is its first introduction worldwide. It is reported that NovoLet is easier to use than any other injection system, as well as being the smallest (14 cm. long) and the most handy (weighing only 16 gm). The disposable syringe has prefilled cartridges which contain one of three different types of insulin (rapid acting, pre-mixed and intermediate acting) -- enough to last 3 to 7 days.

Niel Sniekers, head of Novo Nordisk in the Netherlands, reports in a recent 'Novo Nordisk Magazine' that more than 50% of insulin dependent diabetics in the Netherlands use a pen injection system. He recommends NovoLet as an alternative for the others who might be reluctant to switch to current pen systems because they are worried about inserting the cartridges. (*Scrip*, 1/12/90, p.26).

A US PATENT ON A NON-STAINING IODINE ANTISEPTIC

United Guardian Inc. has been granted a US patent on a non-staining iodine antiseptic. The firm sees the product 'Indosene' competing in medical uses because of its powerful antibacterial activity, freedom from discoloring and lack of 'burn' even on open wounds. Discussions have already begun with a major hospital products company, United Guardian reports and

licensing of the antiseptic is expected in 1990. (*CMR*, 11/27/89, p. 9).

GENETIC ENGINEERING COMES TO THE DAIRY

The new genetically produced hormone bovine somatotropin (BST) has brought the biggest impact of genetic engineering on the dairy science. BST is a protein hormone with several metabolic effects including the promotion of growth in young animals. In lactating cows, it increases milk production. Since it is a protein it can be produced in commercial quantities only by means of recombinant DNA.

The process is simple: the gene for the hormone is taken from the cow and inserted into bacteria which then produces large amounts of the protein. Two companies are already applying to market BST in Europe; Elanco, an American consortium led by Eli Lilly, and Monsanto another American company. Both products are slightly different from the natural hormone.

BST is the first major product of genetic engineering to be offered to farmers. This in itself gives it a high profile. On one hand, the protein hormone has provoked concern about the application of biotechnology from several political pressure groups, including Britain's National farmers Union and animal welfare activists. On the other hand, chemical companies insist that BST is the first in what could become a long series of new products of biotechnology that could mean industries and jobs in Europe. If the new technology is unfairly censured, the companies threaten to move elsewhere.

This new technology brings hope for bringing a new 'operation flood' revolution for milk in India. Whereas Europe is flooded with milk, India is woefully short of milk for the masses. In a vegetarian diet country like India, milk is the vital source of animal protein. Therefore, there will be very little resistance to this new technology in India. (*New Sc.*, 12/2/89, p. 32).

BOVINE SOMATOTROPIN (BST) REVIEWED BY FDA

In reviewing data on the safety of milk and meet from cows treated with bovine growth hormone (also called bovine somatotropin or BST) to boost milk production, FDA in USA has thus far found that BST appears to be safe. During digestion in humans, the drug is broken down into inactive fragments in the gastrointestinal track. Further, even if injected in humans, BST is inactive and has no effect in people.

BST has always been in cow's milk, because it is produced naturally by the animal's pituitary gland. In cow treated with the genetically engineer version of the hormone, no more of t drug reaches the milk than the upp limits of what would occur in untreat cows. BST has always been in cow milk, because it is produced naturally the animal's pituitary gland. In cow treated with the genetically engineer version of the hormone, no more of t drug reaches the milk than the upp limits of what would occur in untreat cows. Before BST can be approved marketing, drug sponsors must sho that their product is safe for the cow a the environment, and that residues milk or meat from treated cows are sa for people to eat. The sponsor must al show that the drug is effective increasing milk production. (*FDA Consumer* 11/1989, p. 3).

A MELANIN INHIBITOR APPROVED BY MINISTRY OF HEALTH & WELFARE IN JAPA

Sheseido (a leading Japanese co metic firm) has recently won approv from the Ministry of Health & Welfa in Japan to market its arbutin prepar tion as a melanin inhibitor. The fir market will be cosmetics, but it hop to extent the product to pharmaceutic use. The compound arbutin inhibi tyrosinase, a melanin generatin enzyme, to inhibit freckles and faci spots. (*Mfg Chem.*, 12/1989, p. 11).

News From Abroad

STUDIES POTENTIAL OF T EUROPEAN MARKET

est Germany's chemical industry is ining the potential for cooperation the countries of the former East-loc, in particular East Germany. As st step, the industry association, and der Chemischem Industrie), will set up an office in West n to advise chemical producers in Germany on questions concerning onmental protection and safety, president Hermann Strenger told alists in Frankfurt.

e discussion of antipollution mat-ould automatically lead to discus-of other topics, added Strenger. The range of possibilities for coopera-could include expansion of trade, ventures, investment in new chem-plants in East Germany and even sitions, he suggested.

enger said VCI member compa-are "basically prepared" to ne active in the East German icals market, but are not willing to pardize their dividends" with y forays" into the market there. At me time, he stressed that "stable eliable background conditions" for tment in Eastern Europe would be requisite for the West German ical industry. If these condtions are ed, companies would be prepared e "certain risks", he added.

e VCI president also noted that the y of East European chemical pro-n is below Western standards. he said, gives rise to the question whether Western investors would lling to spend heavily on revamp-xisting plants or would elect to new facilities.

rning to the financial situation of West German chemical industry, ger said that companies can look rd to another good year in 1990. Although there have been signs that growth is slowing down, he predicted that the chemical industry will increase output by a further 2 per cent this year, after raising output by just under this amount in 1989 compared with 1988.

VCI figures show that industry-wide sales in 1989 rose 6 per cent against 1988 to DM160m ($ 86m) and that earings also improved, although the rates of improvement varied substantially from sector to sector.

On the whole, business was stronger in the first half of 1989, reports the VCI, pointing to a 4 per cent production growth in the first half, compared with 0.5 per cent in the second half.

Looking at production sectors, Strenger pointed to "very lively" business for inorganic and organic base chemicals and continued strong demand for plastics. Fertilizers suffered from cheap import competition and pharmaceuticals made progress only outside. West German Man-made fibres, polyester, especially technical grades, and viscose performed well, while the market for acrylics remained "difficult".

Following the pattern of previous years, West German chemical companies enjoyed better business abroad than at home. At the same time, imports encroached further into the industry's home territory.

Exports of chemicals from West Germany rose 10 per cent against 1988 to DM88bn ($ 52bn), while imports increased 15 per cent to DM45bn. German chemical producers' export ratio rose to a record 54 per cent.

HUNTSMAN, GEP MAKE RIVAL BID

Jon Huntsman's Huntsman Holdings is to join with General Electric Plastics to make a bid for Aristech Chemical, rivalling the Mitsubishi-led management buyout offer made in January. The Huntsman-GE Plastics bid would have to top the $ 844.5m ($26/share) value of the Mitsubishi plan, and would perhaps reach as much as $ 30/share, suggest industry analysts.

Huntsman first made an offer for Aristech last year, but the $ 25/share offer was rejected by the Aristech board as indequate. Huntsman remained keen to acquire Aristech, and informed it of its intention to make a further bid after the Mitsubishi plan became known.

Huntsman and GE Plastics, which announced their firm intention to make a bid of at least $ 27/share just hours before the bid deadline was due to expire on 30 January, are now going ahead to make a formal proposal to Aristech's board. They have requested that Aristech extends its deadline for the submission of bids to at least 14 February.

"I want to emphasize to the special committee and the entire board that we genuinely want to acquire Aristech. As you all know, I have been pursuing this objective for more than a year and fully intend to achieve this goal", wrote Huntsman in an open letter to the chairman of Aristech's special committee of the board of directors. He appealed again to Aristech not to enter into any binding agreements with Mitsubishi or any other parties before receiving the formal bid from Huntsman and GE Plastics.

Aristech announced its board had approved an increased $ 27/share Mitsubishi-led bid, allowing the Japanese group to commence immediately a cash tender offer. The new bid values Aristech at $ 878m.

ENIMONT'S FUTURE UNDER REVIEW

The industrial strategy, ownership and future assets of Enimont are to be

reviewed and possibly renegotiated, say industry sources. The Italian government's inner cabinet which has established a special working group chaired by the country's prime minister Giulio Andreotti will lay down the broad lines of approach to be pursued by ENI and Montedison. The original deadline for reassessment was 1991, but both ENI's president Cagliari and Montedison's Gardini have pressurized the government to take an earlier initiative.

The council confirmed that the government did not plan to tip the balance between the public and private partners in control of Enimont. This decision follows statements made by Andreotti that the government would be willing to review terms of the initial agreements so as to ease difficulties in managing the venture.

Behind the need to redefine Enimont's strategy and ownership lies several months of political interference, which Gardini fears is a threat to the company's growth. It is believed that Gardini wants to incorporate Himont into Enimont and therefore take a majority stake in Enimont. Supporting this argument is Gardini's desire to alter feedstock provision strategy from petroleum products towards PP.

Industry observers say that Himont, which is believed would be worth around L4 trillion ($3.1bn) if it was transferred to Enimont, could present ENI with financial difficulties if it is to maintain an equal shareholder position with Montedison Meanwhile, Enimont is arranging an international revolving credit of FF1bn ($ 263m) for five years, so as to finance acquisitions of industrial assets in France. Sources say this will cover about two-thirds of the cost of Enimont's recent investment in Orkem.

ORKEM/COATES BUY

In a 'very important strategic move', the Orkem Coates group has acquired the West German subsidiary of Tate & Lyle, Hendricks & Sommer, for DM46m ($ 27.3m). The company, which produces resins and emulsions for the paint industry, will provide Coates' resins division, Cray Valley Products, with a manufacturing base in West Germany, said Coates president John Youngman. Hendricks & Sommer will use Cray Valley's worldwide marketing network and will benefit from an exchange of technology.

Youngman believes that the move is of strategic importance for Orkem and Coates. "By taking our resins actively into West Germany with the opening up of Eastern Europe and the implications of 1992 it presents many significant opportunities," he said.

PCD PLACES EMPHASIS ON EUROPEAN POLYMERS NICHE

Petrochemie Danubia (PCD), a member of Austria's partly privatized OMV group, is to concentrate its polymers operations increasingly on technical applications, with particular emphasis given to the West European market, said Dr. Klaus Regensburger, managing director of PCD UK. This is with a view to satisfying the increasing demand for polyolefins, in particular polypropylene, which is still close to double figures he said.

PCD is set to become Western Europe's number 5 in PP in 1990 after the new PP plant, with a capacity of 120 000 ton/year came onstream in Burghausen, West Germany, in December last year. The plant represented an investment of DM225m ($ 134m) for OMV. PCD already has 230 000 ton/year PP capacity at Schwechat in Austria.

Despite relatively low prices for PP in Western Europe and the fear of short-term oversupply from other recent start-ups, Regensburger remains optimistic about PCD's position in the PP business. The company strategy is focused on strengthening grade[s] applications in the automative household appliance industries, he PCD is already achieving exc[ellent] results in West Europe in the PP industry and it now wants to repea[t] success in the UK market, sa[id] Regensburger.

PCD is also seeking a further [addi]tion to its high density polyeth[ylene] (hdPE) business with a 80,000 ton[/year] plant scheduled to come onstrea[m in] January 1991. The plant, involvin[g an] investment by OMV of DM182m [will] be based on the Mitsui process a[nd] located at OMV's Burghausen site[. The] whole production of both plants w[ill be] marketed by PCD for its own acc[ount]. PCD currently operates 90,000 to[n/year] hdPE capacity at Schwechat, in o[pera]tion since 1986, as well as ldPE c[apac]ity of 240,000 ton/year, also at thi[s site].

With the new production in [West] Germany, PCD is emphasizing its [posi]tion as a West European rather th[an] Austrian company, Regensburger [said]. Despite the changes in Eastern Eu[rope] he does not see these develop[ments] affecting West European petroche[micals] producers immediately, but mo[re] commodity producers. Howeve[r, he] believes this huge potential m[arket] offers good opportunities for [West] European companies, in particul[ar] PCD due to its traditionally close [rela]tionship with its neighbouring cou[ntries]. The potential should also be us[ed by] PCD's plastics processing subsidi[aries] such as Novoflor, Polyfelt, an[d its] composites arm, Danutec, of [which] PCD recently sold a 51 per cent [stake to] of Ciba-Geigy. Outside Austria, P[CD's] main markets are West Germany, France, and the UK, although its m[arket] share in Scandinavia is also quit[e con]siderable, said Regensburger.

The company also traditionally [has a] fairly strong position in the Midd[le East] and has recently set up two off[ices in] the Far East where it foresees [good] market potential in technical gra[des].

CHEM TAKES ON CIALITIES

ter the integration within Atochem rkem's petrochemicals, acrylates ertilizers, Atochem could be coned a specialities group, said Loik loch-Prigent in his first press conce as head of Elf Aquitaine. With ddition of the Orkem assets and walt, Atochem was 40 per cent chemicals (petrochemicals, chlorhemicals and fertilizers) and 60 per specialities, he explained. Indepenbanks are currently in the process aluating Orkem's assets, said Le -Prigent. In August, the figure will mmunicated to an extraordinary al assembly of Elf and these assets e transferred to Elfs holding com- Erap, amounting to an increase in capital funds. The actual transfer sets to Atochem will take place the next month.

anwhile, talks with Enterprise re et Chimique (EMC) concernw to strengthen both companies' icals activities to boost their posi- Europe are continuing, he said. ssing Orkem's fertilizer division, Paroisse, which is to be transfer- Elf by mid-year, Le Floch-Prigent e believed it could become a concern, providing it developed thern markets. The northern marere more difficult because of the ce of Norsk Hydro and Kemira. ver, Elf could be "led to work ne or another of the fertilizer nies in southern Europe", he ossibly hinting at a 'southern alli- with Ercros or Enimont. In any here was no intention to sell off tilizer division, he said, as Elf had stream activities to sustain its pment.

cerning, Sanofi, Le Floch-Prigent made 25 acquisitions last year for of around FF1.7bn while pursu- s internationalization strategy. y in 1990, Sanofi has acquired the US-based perfumes group Stern and Continental Flavors & Fragrances, boosting its fast-growing aromas and additives sector. This year, Sanofi's sales abroad should exceed 60 per cent of its total turnover.

GCC AND EC REPS MEET FOR TALKS

Some 80-90 representatives of petrochemical producers from the EC and the Gulf Cooperation Council (GCC) states met in Brussels to discuss industrial issues relating to the proposed EC/GCC free trade area. The meeting, which was called for by the chairman of the GCC working committee Mr. Al-Nouri, chairman of PIC Kuwait, did not form part of the formal negotiations planned between the EC and GCC, stressed a spokesman for the European Association of Petrochemicals Producers (APPE).

The meeting was organised as "a get-together of industrialists" and was not a political discussion, said the spokesman. It was, in the words of the conference chairman, Mike Hyde, a "unique event" in that it was the first occasion so many senior industry executives from the two sides had met together in an attempt to seek areas of future cooperation. Each side stated its respective position, with inevitable differences of opinion in the trade area. European industry representatives insist a free trade area is unreasonable and would put them in a position in which they would be faced with tough competition from cheap imports.

Industrialists from both groups are scheduled to meet in Granada, Spain, at the industrial cooperation conference organized by the EC Commission and the GCC. Both sides will look for areas of technical cooperation on an individual company basis, for example in the area of plastics waste management. Petrochemicals will also be an area of discussion. All parties expressed their satisfaction with the conference and repeated their hope that meetings of this type could continue in a "constructive and pleasant manner" to explore other areas of possible cooperation.

SHELL POISED FOR NICKERSON DECISION

Shell's chemical division is expected to make its decision on whether to sell its Nickerson International Seeds Co. before the end of February, a Shell company source said. Shell first announced it was considering divesting the $ 100m/year business in December.

US seeds investment consultant Teweles & Co, which was appointed by Shell to examine the possible divestment of Nickerson, is not expected to complete its report fully until July. Over 30 bids have been received from interested parties, L. William Teweles said. Shell's final decision on the future of Nickerson will be based on whether any of these is evaluated as favourable from a portfolio point of view said the Shell source.

CP BUYS CANADIAN DETERGENTS

Colgate-Palmolive, the US manufacturer of household and personal care products is to purchase the Canadian detergent business of Bristol-Myers Squibb for $ 172m. The Canadian business consists of the bleach manufactuer Javex and another consumer products company. It has sales of about Can$ 100m/year ($ 84m).

The acquisition is expected to double the Canadian sales of Colgate-Palmolive, say sources. Meanwhile, Bristol-Myers Squibb which reported a $ 353m net loss for the fourth quarter of 1989, which included a $ 693m after-tax charge related to the merger, has denied suggestions that the disposal of its Canadian business had anything to do with the merger. A company spokesman said that the "business just did not fit into the group's portfolio.

Chemical Markets Abroad

SOUTH AMERICAN PP FACES POTENTIAL GLUT

The South American polypropylene market is set to become more dependent on overseas export opportunities in the course of the 1990s if the considerable capacity expansions go ahead. The region could see capacity in excess of domestic demand reach 600,000 to 700,000 ton/year by 1995.

Brazil is at the forefront of the expansion projects. In 1989 it exported 25 per cent of production. Exports can only gain in importance with the expected increase in the gap between Brazilian demand and capacity levels. In 1989 domestic demand stood at 225,000 ton/-year, with capacity at a 90,000 ton/year surplus. By 1995 the surplus is forecast to have reached 415,000 ton/year, with demand growing to 365,000 ton/year.

Factors behind the expected hike are projects by Braspol in Rio de Janeiro state (100,000 ton/year or over), PPH in Rio Grande do Sul (160,000 ton/year expansion), Poliolefinas (100,000 ton/-year plant under construction in Sao Paolo) and Polialden (100,000 ton/year in Bahia). The Petrorio venture, awarded in mid-January to Polibrasil, will bring a further 100,000 ton/year on stream by 1997. Delays of up to two years may yet, however, affect some of the projects.

In Argentina, Ipako is expected to start up 100,000 ton/year, and Perez plans an equal capacity, although this second project is not certain to go ahead. Petroquimica Cuyo, currently able to produce 50,000 ton/year, will increase capacity to 80,000 ton/year. If confirmed, these developments would make Argentina a potential net exporter by 230,000 ton/year in 1995.

In Colombia, 190,000 ton/year are expected to come on stream before 1995; Venezuela is also expected to start-up 70,000 ton/year of new capacity. In both cases, it appears unlikely that domestic demand growth will match the growth in capacity.

Brazil, presently the only major PP producer in the region, has in the past exported 25-30 per cent of its production, mainly to neighbouring countries. With the receptiveness of these markets in question over the coming years, overseas markets may increase in importance.

It appears that Europe will be the market to bear the brunt of the planned South American hikes. Even in the event of Chinese resuming purchases on a scale comparable to 1988 levels, the Far East will become less receptive to imports as domestic capacity is expanded. With the expected growth rate of PP put by some estimates at 6-7 per cent, the impact of the South American plans on Europe will emerge in the mid-1990s.

The increase in South American production will be to some extent countered by the scrapping of relatively obsolete capacity in Europe. One industry spokesperson indicated that 45 per cent of European capacity is based on 'slurry' processes, and is in principle liable to closure over the coming years. Even taking into account the likely cancellation of part of the planned South American hikes, and some scrapping of older capacity in Europe operating rates may quite possibly settle at 75-80 percent, reported one source.

Even if the hikes are balanced by the scrapping of older plants, converters may find themselves in a position to exercise pressure on prices by 1994-95.

Much will depend on PP's scope for expansion at the expense of rival plastics, especially PVC, on which environmental pressures are expected to take a severe toll. A leader in the PP market is targeting the "speciality" end users of the product. At the same time, [...] fidence is derived from the relative effectiveness of PP.

The outlook cannot, however [...] reassuring. It is difficult to forecast [...] growth will characterize the S[...] American converter market, but as[...] ing a correlation with the growth in [...] sonal income, the prospects are [...] good, particularly for some An[...] countries. The evidence points t[...] new capacity in the continent b[...] largely export-oriented. The incenti[...] export in order to obtain fo[...] exchange will furthermore be like[...] influence South American produ[...] decisions.

SPOT STYRENE SLUMPS AFTER CONTRACTS

Styrene prices have plummeted. [...] TI numbers are down to $ 1,000/to[...] NWE, against figures [...] $ 1,165-1,190/ton fob NWE, rec[...]

The main factor behind the decl[...] numbers is the failure of Far E[...] customers to pay the previous h[...] numbers as had been expected [...] reason players had predicted th[...] East players would come in at the h[...] prices was the outage at the Taiwa[...] rene Monomer Corp. Once the 14[...] ton/year unit had gone down, i[...] believed that an already tight sit[...] would be worsened, forcing imm[...] purchases. With the US unable to s[...] the export market, due to a num[...] scheduled and unscheduled ou[...] material could only be sourced [...] Europe. Unfortunately buyers [...] Korea and Taiwan resisted off[...] $1,150-1,200/ton, strongly holdi[...] for lower numbers. It has emerge[...] export product to the Far East ha[...] fixed at $ 1,000/ton fob Rotterd[...]

US INVESTMENT PLANS

The US chemical industry ca[...] maintain its competitiveness in [...] markets by maintaining a free-f[...]

rnational direct investments, Chem- Manufacturers Association (CMA) resentative told a recent congres- nal panel.

According to Nancie Johnson of the IA and manager of international de and investment at Du Pont, gov- nments should resist attempts to pose barriers on foreign direct estment, not only in the US but else- ere as well. The US chemical indus- had one of the highest levels of eign investment, yet still made a large itive contribution to the nation's cur- t account balance, said Johnson.

n 1989 US chemical exports out- pped imports by some $ 16bn. Net ome from overseas operations, ensing fees and royalties should tch 1988's surplus of $ 4.3bn. In total chemical industry's contribution to international accounts should ount to $ 20bn in 1989, said Johnson.

LENE PRICES DIP AS BUYING TEREST WANES

The US motor for higher xylenes ces appears to have stalled, with ces now going into reverse. Observ- note that up to 12,000 tons of unsold ene is in stock in the US Gulf. At the sent time little spot demand is emerg- and players may well have to lower nbers to encourage sales.

Throughout January strong US nand, due to a number of cold ather outages in the Houston area and h gasoline blending consumption, x numbers high.

European prices kept pace with US vements. In the first weeks of Jan- ry, virgin xylenes prices jumped from 265/ton fob NWE to $ 300/ton NWE. ces eventually reached up to 315/ton fob NWE, when the market ception changed direction. Most bus- ss now appears to take place in either all parcels or through the distribution als. The speed of the US hikes was reflected in the two-tier contract system which emerged in January. Initial contracts were settled at 81 cent/gallon (these were eventually upgraded to 87 cent/gallon). After the cold spell descended, a second set of contracts were fixed at $ 1.00/gallon. The higher figures translated into over $ 300/ton cif NEW, which is where European numbers settled.

It appears that US contract postings for February are beginning to emerge. So far, numbers of $ 1.05-1.10/gallon have been heard but a number of players have expressed scepticism on whether these numbers are attainable. It is being said that in the present circumstances any price over $ 1.00/gallon would be a good settlement.

However, observers remark that two factors have the potential to push xylenes prices back up. If the gasoline prices recover, to their start-of-year levels, then buying in incremental octane additives such as xylenes will again be economically viable. There are also signs that the gasoline blending season count start early this year.

The five North Eastern states which have legislated for lower vapour gasoline, for at least part of the year, are thought to want the product at the pumps earlier than had been originally predicted.

Because xylenes are one of the acceptable octane enhancers in the production of lower vapour pressure gasoline then demand from blenders could improve markedly in the second half of February. As MTBE, another favoured gasoline additive is not in plentiful supply, then xylenes' chances of coming to the force have improved.

NORLATEX STARTS UP

Norlatex OY, a joint venture between Neste and Rhone-Poulenc, has commissioned 20,000 ton/year styrene butadiene latex plant in Porvoo, Finland. Investment in the plant came to FM44m ($ 11.1m).

The 50/50 joint venture was established to meet the strong demand for SB-latex coated high quality paper and board. Finnish demand for SB-latex is fairly strong with consumption reaching 100,000 ton in 1989. Most of the new material is targetted for the Finnish market, where demand is expected to stay healthy.

CUMENE SHOWS STEADY GROWTH

Cumene is to see moderate but continuing growth from its derivative, phenol, through to 1993; little growth stimulus will come from its other downstream application, acetone, where the outlook is one of relative stagnation. These are the prospects raised in a study by the Freedonia Group examining how cumene's derivatives will fare over the coming years in the US market.

The rosier picture for phenol is due mainly to bisphenol-A(BPA), where has registered double-figure demand growth in recent years, causing it to account for nearly 29 per cent of phenol consumption by 1988. As the feedstock for a range of resins, BPA is expected by Freedonia to register 6.5 per cent/year demand growth through to 1993.

Support has come so far mainly from polycarbonate and epoxy resins. The former has its base for future growth in building and construction applications (for relatively small though strongly growing volumes) and in the compact disc sector, which shows continuing scope for expansion.

Vigorous growth — figures close to 10 per cent/year — will come from the other major BPA application, epoxy resins. Noted for their mechanical, electrical and thermal properties, these find their main uses in the protective coating of electrical installations, in adhesives and in composites.

Biotechnology

PROTEUS MODELS AIDS VIRUS TO FIND POTENTIAL VACCINE

Proteus Biotechnology, a UK company based in Marple, Cheshire, has designed a protein which it has shown could be a potential Aids vaccine. Proteus scientists have used a computer generated model of the virus to genetically engineer a molecule which mimics the surface of the Aids virus as it appears to the bodies' immune system causing it to stimulate the production of antibodies. The development overcomes the need to introduce an inactive form of the virus to the body, as would be done in conventional vaccination methods but which would be exceedingly dangerous for the case of Aids.

The artificial peptide vaccine is based on discontinuous determinants, ie., the sites by which the immune system recognises a virus. Proteus used its Bio Engine computer design system incorporating its own Prometheus software to obtain the three dimensional fingerprint of the Aids virus. the company claims to be first in developing a potential vaccine which bears little chemical similarity to the virus formula but instead is similar to its shape.

The company has tested the molecule in sheep under a collaborative agreement with Peptide Technology of Australia. The vaccine successfully led to the formation of antibodies. These antibodies showed a higher specificity to the Aids virus than any other agent tested previously.

Proteus has also produced a molecular copy of the virus which it used in tests as a target for the antibodies produced earlier in response to the vaccine. This has enabled experimental results to indicate such promise towards a vaccine for HIV.

Proteus managing director, John Pool explained that the vaccine stimulated antibodies specific to a single part of the Aids virus envelope. The stimulation should be applicable to most variants of the virus as the surface area is least susceptable to mutation.

The Peptide Technology researchers believe the unusual strength of the interaction between the antibody and the virus may indicate that a curative therapy can be envisaged.

W-L UNVEILS "BIO-PLASTIC" STARCH

Warner-Lambert is claiming a "major advance" in materials science with the development of a biodegradable material made almost entirely from starch, such as derived from corn or potatoes. The "bio-plastic starch" could replace conventional plastics in a wide-range of applications.

The research programme is in its very early stages, chairman and ceo Joseph Williams said, but "it does hold promise as an attractive business opportunity." The company is establishing a facility at its headquarters in Morris Plains, New Jersey, to exploit the technology further.

The new material is the result of an eight-year research programme at the company's Capsugel division, which produces empty hard gelatin capsules. Scientists attempting to develop a more efficient way to manufacture capsules discovered they were able to melt starch without it decomposing.

"Others have tried in the past, but the water has boiled off and the starch burned. By using a chamber akin to a pressure cooker we have succeeded in trapping the water inside", a spokesman said. "The material is completely different from any other so called biodegradable product on the market."

Williams revealed that the material has already been used to produce a starch-based pharmaceutical cap manufactured by injection mouldin engineered tolerances. He sees no entific barriers to eventually mal plastics by the other thermoproces methods.

The company intends to market material under the tradename No Williams said he expects sales reve within two or three years. First po tial applications are envisaged wh end-products are of short-use or a posable nature and where high mech ical properties are not required. Lon term, the company says it exp improvements in mechanical proper from further modifications of the st material.

REPLIGEN FINDS PF4 POSSIBLE CANCER CURE

Repligen, a US biotech compa claims platelet factor 4 (PF4), a nat human protein it has genetically eng ered, can block the unwanted forma of new blood vessels that occurs variety of diseases, including canc

Test results published in the jou Science suggest recombinant hur PF4 can be used to check the prog of diseases such as Kaposi's sarco malignant tumours, diabetic retinopa and neovascular glaucoma by prev ing new blood vessels growing. development of new blood ves (angiogenesis) is understood to essential for tumour growth and Re gen believes that blocking this proc provides a potential therapy for treat solid tumours. PF4 is naturally foun platelets, the blood cells resonsible clotting. The ability of PF4 to inhibit growth of new blood vessels deri from it specific inhibition of grow factor stimulated endothelial cell p duction. Repligen claims its recom nant human PF4 product, Endostatin will be non-immunogenic, n immuno-suppressive and has a low t icity in humans, a significant adva over many existing cancer therapi

GEN/GENENTECH AGREE PATENT CROSS-LICENSING

S biotech companies Biogen and entech have agreed to cross license patents for human recombinant ma interferon in the US. The ami- e agreement avoids what could have me a lengthy and costly legal battle. he same time, Biogen has granted entech a non-exclusive worldwide ce for process patents relating to secretion of proteins.

nder the cross-licence agreement, company will be able to sell its ma interferon product (Biogen's uneron and Genentech's Acti- ne) in the US for specific therapeu- nd diagnostic applications, without nging the other's patents.

iogen expects to complete a phase inical trial in the US with Immun- for the treatment of venereal warts later this year. The company has also conducted clinical trials with its gamma interferon product for the treatment of rheumatoid arthritis.

Genentech has filed a product licence application with the US Food and Drug Administration to market Actimmune to treat patients with chronic granulomatous disease (CGD). CGD is a rare inherited disorder which is characterized by an impaired immune system.

Genentech is also conducting phase III clinical trials to evaluate Actimmune's usefulness in treating infections in patients who have endured severe trauma, and as an adjuvant therapy in the treatment of patients with malignant melanoma and small-cell lung cancer.

Both companies declined to give details of the cross-licence agreement or to speculate on whether other similar deals would follow. A spokesman for Biogen said simply "each company has rights the other wanted". "We would much rather come to terms than go to court", he added. Negotiations took around 18 months.

Outside the US, Biogen said its patent position "was better". The company already has gamma interferon on the market in West Germany, though its licensor Rentschler, for the treatment of rheumatoid arthritis. Its Japanese licensor Shionogi is set to introduce the product in Japan next month for the treatment of renal cell cancer.

LARGE PROFITS FROM SMALL PLANTS

Flowering rose plants no larger than an adult finger, minature banana, peperomia, helioconia, strawberry, coffee and orchid plants. These were among the gifts many Singaporeans received for Christmas recently.

They came in sterile glass containers

filled with sufficient nutrients in an agar suspension to sustain the plants for up to three months, after which their new owners can re-pot them in a natural environment to grow like normal members of their species.

Put on the market by Plantek Interntional, a Singapore biotechnology company, the miniature plants stemmed from recent developments in tissue culture techniques, which has become an important alternative to conventional means of propagation.

The method, called micropropagation, involves growing plant parts or tissues into tiny but mature young specimens in an "in vitro aseptic environment" — a test tube under controlled laboratory conditions. The method is similar to those used to culture fungi, bacteria and other microorganisms.

What characterises this technology is its potential to clone a plant at a very high rate; commercial laboratories can produce several million specimens a year.

Other species can be cloned by the method. They include ornamental plants such as gerbera, lily and anthurium; plant crops like tea, papaya, blackberry and grape; and big trees such as acacia, eucalyptus and leucaena.

The mass cloning of desirable — that is, high-yield and disease-free plants has the greatest profit potential when applied to plantation crops. In that direction, Plantek has embarked on a joint project with Kasetsart University in Bangkok to apply the tissue culture method to clone and mass-produce high-grade cashew trees, such as those which can withstand droughts and produce more and bigger nuts.

Market Potential

Currently, cashew production is both costly and labour-intensive. Air-layering, the traditional method of raising the number of plants, yields no more than 80 plants from a tree every year. But with tissue culture, over 10,000 clones can be made from a single tree annually.

Cashew is the third largest crop nut traded internationally, after hazelnut and almond; the current world production of 500,000 tonnes a year is already insufficient to meet demand, which is expected to reach a million tonnes by the year 2000.

BACTERIA THRIVING IN TOLUENE DISCOVERED

Bacteria that thrive at outrageously high temperatures and in extreme alkaline conditions are strange enough. But a recent discovery has exceeded all conceptions of what constitutes a decent environment. This feisty life-form can thrive in a 70 per cent solution of toluene, an organic liquid used in the manufacture of explosives.

Normal organisms perish in even a 0.1 per cent solution of the chemical. The newly discovered bug also tolerates high concentrations of xylene, styrene and other organic solvents that are toxic to most forms of life.

Nobody has any good idea why such bacteria orginally evolved and under what conditions. Says Koki Morikoshi, Chief Scientist, Institute of Physical and Chemical Research of Japan. "Some bugs had to eat toluene, because of a lack of other nutrients.

So they can hydrolyse toluene and had the ability to eat other nutrients in the toluene. And then it somehow changed to a so-called "modern microorganism". Horishoki's team has identified a fragment of DNA, the basic stuff of life, that appears to be partly responsible for the bacterium's tolerance to toluene.

Surprisingly, the original bug found in normal soil. Though resea ers have looked in oil wells and tar as well as factory exhaust and refi sites, they couldn't find other such teria. "We don't have any idea wh couldn't" says Horikoshi now, "but puzzle must be answered. We trie make a new bacterium from this which can metabolise toluene. unfortunately the new one soon cha to the toluene-sensitive type."

Toluene resistance is more th laboratory curiosity. Like the lac degrading enzyme, it has potential in industry. For instance, certain mentation processes now require amounts of water and hence extre large fermentation vessels — becau the low solubility of some of the c pounds involved.

"But if we use an organic solve says Horikoshi, "we can easily diss water-insoluble compounds, and make an efficient conversion — th my philosophy." What that will re is isolation of the genes responsibl solvent-tolerance and their transfe various bacteria used in industrial cesses. This could happen within years.

BIRTH CONTROL MOSQUIT

A major emphasis of the stru against insects that threaten hu health is natural control — tur chemicals that exist naturally in ins bodies against their owners. A spe ular example of this has rec emerged from the University of Flo

Entomologist Don Borovsky has lated a hormone that can be used to trol not only several types of mos but also other insects. "We al know that it has an effect on house stable flies, fleas and eight spec mosquito," Borovsky told the Inte tional Chemical Congress of Pa Basin Societies in Honolulu.

Environment

HOECHST PLANS DM2.3bn ANTI-POLLUTION CONTROLS

Hoechst plans to invest nearly DM1.8bn ($ 1.1bn) in anti-pollution plant and equipment over the next six years, as part of an ongoing ten-year programme designed to improve environment protection and safety at its production plants, writes Dede Williams. The cost of operating anti-pollution plant and equipment is expected to cost an additional DM1.5bn by 1996, chairman Wolfgang Hilger said recently in Frankfurt, bringing total expenditure to DM2.3bn over the ten-year period.

Stressing that Hoechst sees environmental protection "more comprehensively now than in the past," Hilger said that a large chemical company such as Hoechst must address three major areas. It must assess the environmental impact of its production processes; assess the effect of its products on the environment; and determine the best method for disposing of used products.

The chairman said that the chemical industry cannot upgrade its environmental technology "from one day to the next", not only because the technologies of tomorrow will take time to develop, but also because economic restraints prevent all projects from being realized simultaneously. He noted that companies will have to bridge the gap until strategies for avoiding or recycling wastes take hold and must in the meantime seek "acceptable compromises" in dialogue with critics.

Breaking down the environmental investment budget, Hilger said that some DM910m of the total has been earmarked for measures to avoid water pollution, while DM470m is to be spent on emissions control and DM402m on waste disposal by 1996. Major projects planned include a recycling plan sulphuric acid, a production res incinerator, a sludge incinerator a solvent vapour incinerator, all at Fr furt.

Board member Karl Holoubek he does not expect public oppositi the sulphuric acid recycling facility the sludge incinerator to be as v ment as objections to the produ wastes incinerator. However, with thy approval procedures in West many, none of the plants is expect stream before 1994.

The 130,000 ton/year sulphuric recycling plant will cut discharg sulphate into the river Main "con ably" and will also reduce organi charges, according to Holoubek. will first be concentrated to a 60 pe solution and then in a second stag be thermally separated into su dioxide and water. In a final stag sulphur dioxide will be processe 30 per cent sulphuric acid.

Hoechst is still awaiting ap from Hesse state for a new plant t 60,000 ton/year of toxic waste. ever, opponents have indicated the continue their fight against the fa Hoechst now estimates that the will cost DM160m to build inst the DM135m orginally envi because technical alterations wil to be made to comply with tighte ronmental legislation.

Both Hilger and Holoubek und that building new incineration fa is one of the company's highest ities, along with developing new avoidance strategies and recyclin company has no on-site facilit depositing toxic waste and a p incinerator to be operated by owned Hessischer Industrie M Mainhausen has been delayed years because of public protes rently, Hoechst disposes 40 ton/year of sludge at the contr Schonberg and Schoneiche

ps in East Germany, but the East man authorities have now ounced the closure of Schoneiche.

s an alternative, the company has ied for permission to dispose of ,000 ton/year of toxic waste from its se plants in a former bituminous mine it owns near Knapsack in th Rhine-Westphalia.

o date, the company has deposited 00 ton/year of waste from its Frank- Wiesbaden and Offenback plants he site and estimates that 1m ton ld be dumped there by the year 0.

E OBJECTS TO SANDOZ ANT

ire's planning board is expected to d a public hearing this month to dis- s objections to the I£170m ($266m) maceuticals plant which Sandoz has osed at Ringaskiddy, County Cork.

he plant has been officially roved by the Irish government and Cork county council, subject to con- ons.

is seen by the Irish industrial devel- ent authority as crucial to its efforts ttract other major chemical compa- into the country, especially in the e of the cancelled Merrell Dow pro-

espite the fact that Sandoz has ounced its acceptance of almost all 70 conditions attached to the plan- permission, there are some 16 eals against the county council's ision. Sandoz' project engineer for plant, Winfried Pederson, described conditions as the most stringent ever osed on the company.

C FIRMS SLAM CUTBACK HEDULE

roducers and users of chlorofluoro- ons (CFC's) in West Germany have expressed dissatisfaction with the federal environment ministry's plans for a 95 per cent cutback in consumption of CFC's by 1995.

At a hearing in Bonn, the chloro fluoro carbon industry said it agreed with federal environment minister Klaus Topfer that consumption must be cut to a minimum. However, a quick pullback would threaten "sensitive" branches of industry and create barriers to trade.

Chloro fluoro carbon users take issue with phase two of the environment ministry's time-table, which foresees a 50 per cent cut in chloro fluoro carbon consumption by the end of this year, a 75 per cent cutback by the end of 1992 and a 95 per cent reduction by the end of 1995.

While producers of polyurethane foam have indicated they can comply with the schedule, the refrigeration sector is believed to be having more difficulty.

Meanwhile, the European commission has proposed that CFC's should be eliminated in the EC by 1997, three years ahead of the date generally agreed worldwide.

In a draft regulation to the council, the commission also calls for increasing restrictions on imports, exports, production and consumption of halons, carbon tetrachloride and methyl chloroform.

Imports of these substances from countries that are not signatories of the Montreal protocol would be prohibited from 1 January 1991, with certain exceptions.

As from 1 January 1993, imports into the EC of products containing these substances and manufactured in countries that are not signatories to the protocol would be banned.

News About New Projects

MOBIL SETS SIGHTS ON FAR EAST AROMATICS MARKET

Mobil Corp. is to enter the Far Eastern aromatics market with the construction of a 600 000 ton/year complex in Singapore. The Jurong plant will be operated by Mobil Singapore Pte Ltd. The company has chosen UOP to design the plant, based on the Parex paraxylene process. Bids for detailed engineering, procurement and construction are currently being evaluated.

Scheduled for completion in early 1993, the complex is slated to produce 300 000 ton/year paraxylene, 175 000 ton/year benzene and smaller volumes of orthoxylene and aromatic solvents. Conversion of benzene to cyclohexane is also being considered.

Mobil will upgrade its fuels refinery in Singapore to supply the new plant, and increase gasoline production by 8,000 barrel/day to help meet local demand. The new fuels process units will include a 38,000 barrel/day continuous catalytic reformer, associated naphtha pretreater facilities and a gas plant.

Target markets for the aromatics will be East and Southeast Asia, where demand has been growing at 5-10 per cent/year. Mobil Petrochemical International, a Mobil Chemical Co. subsidiary, already markets petrochemicals in the Far East and will operate its aromatics sales from Jurong.

Meanwhile, in India, UOP has tied up with Delhi-based JK Synthetics for its Saleempur aromatics complex. Set to produce 100,000 ton/year benzene, 108,000 ton/year paraxylene (for conversion to 150,000 ton/year PTA), 35,000 ton/year orthoxylene, and 50,000 ton/year cyclohexane, the complex is slated for startup in the last quarter of 1992. Total value of the petrochemicals complex is now set at Rs. 12.5 bn. ($744m). A separate company, JK Petrochemicals Ltd. has been set up for management of the project.

ALBY-OLIN UNVEILS US CHLORATE PLAN

Alby-Olin, a joint venture between Olin of the US and Stora Kemi of Sweden is to build a second sodium chlorate plant in North America. The 100,000 ton/year facility is expected on stream in Janaury 1992.

Three sites are being evaluated for the project. Two, Charleston in Tennesse and McIntosh, Alabama, are existing Olin sites. The Charleston facility has existing units for chlor-alkali production, pool chemicals (calcium hypochlorite) and textile chemicals.

The McIntosh site also has a chlor-alkali unit, as well as blending and storage facilities for aerospace fuels, particularly hydrazine.

The third site under considerati believed to be in the southern U choice will be made on the bas which site offers the best combin of electric power, railway connec and other services.

BAYER PLANS ABS SPANIS EXPANSION

Bayer Hispania plans to ex acrylonitrile-butadiene-styrene (AB its Tarragona, Spain, complex, technology is being develope Bayer, which hopes to increase c ity by around 15,000 to 40,000 ton by the end of this year. Estimate of expansion is Pta15-17 ($138-157m).

Bayer's expansion of methyl cyanate (MDI) at Tarragona is according to schedule and is to co stream in 1991. Bayer is using it

nology and is responsible for pro- management of the Pta 15bn unit. proposed formaldehyde plant, how- , "has been postponed and is not er active discussion at this time", a Bayer spokesman at Leverkusen. itional product from both the ABS MDI plants will be used on the nestic market and for export.

BRIGHT & WILSON STUDIES CHLORALKALI OPTION

lbright & Wilson has confirmed that thinking of building a chloralkali t at its Oldbury, West Midlands site he UK. A feasibility study has been erway for some twelve months and included discussions with major tractors in the field such as Lurgi, le and Comprimo. A decision on the ect is anticipated at the end of this says A&W's technical director n Adsetts. And if it went ahead con- ction would not be completed before 2. A capacity figure for the plant is available at this stage.

he company uses large quantities of orine at its Oldbury site which it cur- ly buys in and stores in significant umes on site. It is a Cimah regulated that is, one that contains large quan- s of 'hazardous' materials. Adsetts ss A&W wants to reduce the amount chlorine it has to store at the site ch is in densely populated area.

Options under evaluation, according Adsetts, are building a chloralkali nt on the site, changing the technol- of existing chlorine-based units e so that they use less chlorine, and iewing the whole area of handling distribution.

Apart from using lots of chlorine, W is one of the largest consumers caustic soda in the UK — used as a dstock for its detergents business. A nt producing both chlorine and caus- soda would be a natural move for the npany. A&W has invested heavily at Oldbury site in recent years. Last year it brought three projects on stream there. It expanded its phosphorus chemicals capacity, in particular for phosphorus trichloride. It completed a phosphorous acid expansion, and at the end of the year commissioned a new plant producing the agrochemical intermediate ethyl PCT. In the first quarter next year it plans to commission new phosphates capacity. Adsetts confirms there are plans for further investment at the site.

LUMMUS SCOOPS PASA CONTRACTS

Buenos Aires-based PASA Petroquimica Argentina is investing a little over $ 100m in expanding its petrochemicals complex at San Lorenzo, Santa Fe. Schdeuled for completion in the first half of 1993, the project embraces revamps of benzene from 80,000 to 150,000 ton/year, ethylene from 24,000 to 45-50,000 ton/year, styrene from 82,000 to 150,000 ton/year and a new ethylbenzene (EB) unit of 150,000 ton.

The EB plant will replace an existing unit of 80,000 ton, which is to be modified to produce around 40-50,000 ton/year cumene. Each area (ethylene, styrene, aromatics, EB) involves an investment of around $ 20, with offsites accounting for the remaining $ 20m.

Lummus Crest has been selected to provide basic engineering for the entire complex and technology for everything except the benzene unit: "This will go to either UOP or France's IFP", said Rodolfo Dietrich, PASA's manager of planning and development. "We will decide within the next 30 days. Liquid feedstock piped from YPF in the north of the country is to be increased; this will processed at PASA's on-site reforming unit. Benzene will be produced by dealkylation of toluene and xylenes. Basic engineering for the complex is to be developed during 1990 and construction is to start in the first half of 1992.

News From Japan

TSUBISHI TO CONSTRUCT ,000-TON/YEAR ETHYLENE ANT

litsuibishi Petrochemical Co., has rted to the Ministry of International le and Industry its plan to build a ,000-ton/year ethylene plant (poten- capacity:450,000 t/y) at its Kashima ks (Ibaraki Prefecture). Construction k will begin in July with start-up of new plant scheduled for mid-1992.

nder the plan, the company is also duled to produce benzene (150,000 year), Polyethylene (80,000 ton/-) polypropylene (80,000 ton/year), lene oxide (110,000 ton/year) and lene glycol (100,000 ton/year). g with this, it plans to mothball uction facilities for PP (30,000 ear, EO (80,000 ton/year) and EG 00 ton/year).

e total construction cost covering structure as well as manufacturing s is estimated at roughly ¥105 bil- Mitsubishi Kasei Corp. will invest t ¥20 billion to build ethylene/poly- n plants in partnership with Mit- hi Petrochemical. The two com- s intend to push forward co- tive sales of the planned products effort to maintain order within the stry.

trochemical products resulting the ethylene project will be worth oximately ¥70 billion a year.

th regard to outlets for the 300,000 ear of ethylene, 100,000 tons will ed to meet the shortage of the pro- that Mitsubishi Petrochemical is iencing, 100,000 tons will be fed w plants for EO, EG, HDPE and PE — which will be jointly built e two companies — and the ning 100,000 tons will be supplied rd parties. Japan's petrochemical try was hard hit by the two oil and scrapped production facilities in line with a special law. Since 1987, however, demand for petrochemical products has been rapidly growing both at home and abroad and a total of six ethylene projects were worked out in Japan last year.

Construction of ethylene plants has been suspended in Japan and the 300,000 ton/year plant envisaged by Mitsubishi Petrochemical will be the first to be built here since 1983. It will be interesting to see how the second and third ethylene projects will be implemented from now on.

President M. Yoshida of Mitsubishi Petrochemical says: "The Kashima works is in an advantageous location. An essential point is how to ensure a steady supply of raw materials such as naphtha, heavy NGL and LPG. We would like to scale up the production capacity to 450,000 tons a year, taking into account supply and demand trends and other makers' opinions".

120 CHEMICALS TO BE EXEMPTED FROM IMPORT TARIFF IN APRIL

Roughly 120 chemical items are included in the list of some 1,400 items of manufactured and mining goods the abolition (at the beginning of fiscal 1990) of the import tariffs of which has been asked for, to promote Japan's imports and slash her trade surplus.

The recommendation was made by Customs Tariff Council, an advisory panel for the Minister of Finance, and the Ministry of Finance — based on the report submitted by the council — will draft a bill to revise related laws for submission to the Diet so that the proposal can go into effect from April 1, ministry officials say.

This step will raise the share of Japan's nontariff goods in all imported products combined from 42 to 56%, and annual imports of the chemical items undergoing tariff exemption are estimated at some ¥150 billion, about 10% of the combined imports of all the goods covered by the tariff-abolishment plan.

The chemical and related items in question are: high-temperature coal tar distillate and two related products (current tariff 3%); 21 inorganic chemicals including iodine (3%), rare gases and aluminum sulfide (2%); 69 photo-related products including instant printing film; seven antibiotics including streptomycin (4.6%); 10 tire and related products; and others including inner tubes, rubber gloves, floor-use rubber mats and catalysts (platinum, etc).

5 JAPANESE FIRMS JOIN U.S. POLYMER DESIGNING CONSORTIUM

Ryoka Systems Inc. an affiliate of Mitsubishi Kasei Corp., has revealed that five Japanese Chemical companies have joined an American "polymer consortium" for which Ryoka Systems acts as a go-between in Japan. The consortium promoted by Biosym Technologies Inc. of the U.S. is aimed at developing a comprehensive polymer designing system by means of theoretical chemistry and statistical mechanics-based processes.

The five companies are: Asahi Chemical Industry Co., Showa Denko K.K., Sumitomo Chemical Co., Mitsubishi Petrochemical Co. and Unitika Ltd. The membership fee is $75,000 per annum. Including the five Japanese firms, the member companies of the consortium now number 27 and include BASF, Ciba-Geigy, Dow, Du Pont, ICI, Rhone-Poulenc, Amoco, Atochem, Bayer and Hoechst Celanese.

Ryoka intends to recruit three to five other Japanese companies for the membership.

The polymer consortium has been operated with Bruce E. Eichinger Ph.D. as director and top-notch Western

researchers as staff members. It seems that the member companies will be offered around February software associated with quantitative structure property relationships as the first research result of the consortium.

3 FIRMS AGREE ON FS FOR JOINT 600,000 TON/YEAR ETHYLENE PROJECT

Three Japanese petrochemical companies reached agreement in late December to start a joint feasibility study (FS) for a new 600,000-t/y ethylene plant project in Chiba. The three are Maruzen Petrochemical Co., Sumitomo Chemical Co. and Mitsui Petrochemical Industries Ltd.

This is in line with two other ethylene projects — the Kashima ethylene project by Mitsubishi Petrochemical and the Ube one by Mitsui Toatsu Chemicals, Inc. and Ube Industries, Ltd. The former project was explained early in December to the Ministry of Interntional Trade and Industry and will soon be undertaken. As for the latter, a joint firm was started late last December to carry out a feasibility study.

The said three companies have so far discussed the joint undertaking of the ethylene project in Chiba, aiming at plant completion between 1993 and 1995. They are short of ethylene for expanding derivatives production. Along with the environment assessment which they have already started, they will from now on elaborate the plan with regard to the manufacturing technology to be adopted, and the allotments of production and investment rations, etc.

It is believed that official approval for the project will take at least 27 months because Chiba is adjacent to the Tokyo metropolitan area and thus greater consideration must be given as regards environmental issues.

In addition to the three above mentioned projects, there are three other ethylene plants in Japan, of which the precise details may be revealed in the near future.

JAPAN'S OIL IMPORTS UP 14.8% IN NOVEMBER

Japan's crude oil imports in November rose 14.8% from a year earlier to 18.78 million kl, the government reported in its preliminary data.

In releasing the data, an official at the Ministry of International Trade and Industry (MITI) attributed the rise of solid domestic demand for refined oil and Japan's increased exports of fuel to Asia.

Japan's exports of fuel oil shot up six times the level of November of the previous year to 470,000 l, chiefly because of soaring demand in Asia, according to the official.

"Singapore used to process most crude oil for use in other Asian countries, but in November last year, such demand surged more than the level the country can possibly produce," he said.

Japan's crude oil imports from the Middle East rose sharply by 27.3%, with its dependency on imports from the Organization of Petroleum Exporting Countries (OPEC) standing at 81.4%. The ratio was the highest since November, 1984, when it was 83.1%.

Of the total, the United Arab Emirates (UAE), Saudi Arabia and Indonesia were the top three oil suppliers in terms of volume during November.

Imports from the UAE totaled 4.76 million kl, Saudi Arabia 2.17 million kl, and Indonesia 2.12 million kl. Domestic production of fuel oil reached 15.11 million kl, up 8.7% on double-digit increases in output of gasoline, naphtha, diesel oil and jet engine fuel.

Imports of fuel oil were up 0.6% to 4.09 million kl, in which kerose diesel oil and A-type oil rose.

Domestic sales of fuel, howe dropped 0.8% to 18.24 million kl to a warmer than expected weathe November, the official said.

MITSUI PETROCHEMICAL TO PUSH SALES OF 3 POLYMER FOR CAR PARTS

Mitsui Petrochemical Industries L has decided to push forward with b iness in three polymer — polypro lene, olefin-based thermopla elastomer and ethylene-propylene-di terpolymer (EPT) — for use in car pa The company has been supplyin variety of polymers for car parts now considers it necessary to s emphasis to the three polymers.

For polypropylene, the company tackle development of new-type p ducts with higher molecular number the blow-molding process becomes valent, following injection molding. regards thermoplastic elastomers, exploiting the market for bumper and will, from now on, stress appl tion to sheets as a possible replacen for PVC ones. Use for the boots of bodies is also likely to grow, the c pany says.

It will put on the market this year new types of EPT having good heat oil resistance which, supplied as s ples, are receiving good user respo

Its thermoplastic elastomers are b manufactured in the U.S., on a c mission basis for use in bumpers instrument panels. For the Europ market where bumper use is not mising, it intends to push sales for latter use.

NOVO NORDISK TO GEAR UP FOR SHARE EXPANSION IN JAPAN

Novo Yakuhin K.K. Japanese s

of Novo Nordisk A/S of Denmark, carry out a plan to expand the er of its detail men to mark the ion of merging at the end of Jan- with Novo Nordisk Pharma Ltd., er Japanese subsidiary of Novo isk.

der the plan, the combined number e two merging firms' detail men at 95 will be increased to more than and doubled to 200 in four to five . This is intended to expand their s of the Japanese markets for insu- human growth hormone prepara- and hypoglycemia-treatment .

vo Yakuthin hopes this step, along ntroduction of a new-type syringe push up the combined sales of the rms by around 13% in the coming year beginning in April. Their r will come about as a result of erger in April 1989 of their respec- arent firms — Novo Industri A/S Nordisk Gentofte A/S.

subsidiaries have been supplying preparations in Japan with Novo in holding 55% of the Japanese market and Novo Nordisk, 5% to a total of 60%. Last December Yakuhin began marketing here w pen-shaped syringes useful for ulin shot and it hopes they will oost the market shares.

CHI, SANOFI SET UP T DRUG FIRM IN PARIS

chi Seiyaku Co. and Sanofi S.A. have established a 51/49 joint ay called Laboratories Daiichi in Paris, France. The joint com- capitalized at one million French and President T. Suzuki of the e firm has assumed its presi-

new company will import, man- e and market in France cures ed by Daiichi Seiyaku for otic diseases. As a first step, it is scheduled to put within this year a thromboxane-A_2 inhibitor (development code: DP-1904) into phase-II clinical tests in France.

The target agent is believed to inhibit the synthesis of thromboxane A_2 — which flocculates blood platelets —, thereby serving as a cure for thrombosis. In Japan, it has already been subjected to phase-II clinical tests.

Daiichi Seiyaku and Sanofi previously concluded a contract aimed at marketing self-developed cures for thrombotic disease in each other's countries. In line with this contract, they set up Sanofi Daiichi Co. in Japan last year. The joint company has inaugurated clinical tests on an antiplatelet agent (SR-25990) developed by the French firm.

JAPAN, U.K. TO START JOINT 5-yr. ¥2.5 BIL. NOVEL MATERIAL RESEARCH

Research Development Corporation of Japan attached to Science and Technology Agency will launch joint research with two British universities will regard to atomic arrangement designing and control for novel materials. Science and Engineering Research Council of the U.K. will also support the project.

The project will start this March and last for a 5-year period during which about ¥2.5 billion will be invested mainly by the Japanese side. It will be the largest international basic-research task in which the Japanese government is involved. This is the first of the international co-operative research projects announced last October by the corporation.

Science and Technology Agency has pledged to give full support to the project as it sees the plan as being in accordance with the aims of the Japanese science-development policy. Back of this is the interchange between experts at the agency's National Research Institute for Metals (NRIM) and those at Universities of Cambridge and London. NRIM is known for its R&D background for new materials.

The project is intended to undertake basic and fundamental research regarding atomic and molecular-level designing and control of metal and semiconductor-based materials. Progress in this research is believed to contribute to development and application of newer functional materials to be used for aircraft, spacecraft and electronics equipment.

According to the plan, the participants from both Japan and the U.K. in the project will number 15-20. The Japanese experts who will join it will come from the academic, governmental and private sectors, an official says.

POLYETHYLENE PRODUCTION/SHIPMENT EXPECTED TO HIT NEW HIGH

Major polyethylene manufacturers recently drew up a record of supply and demand in 1989 (partially estimated) and established prospects for supply and demand of high and low density polyethylene in 1990. According to them, production and shipment of both LDPE and HDPE rose to new historical highs in 1989, buttressed by brisk domestic demand. Also domestic demand for LDPE exceeded the 1,500,000-ton level for the first time. Thus, the high supply-and-demand level that was first recorded in 1987 was completely maintained.

It is expected that the tempo of expansion of domestic demand will slow down slightly in 1990, but that the facilities and equipment concerned will remain in full operation because of the effects to be produced by the shipment to help Phillips of the United States and because the expansion of production capacity by the use of the existing facilities and equipment is nearing the limit. The amount of production was

1,637,000 tons. Both production and shipment rose to a new all-time high.

As for prospects for supply and demand in 1990, the manufacturers think that domestic demand will remain firm and that imports will decrease while exports will increase further, making for the continuation of a high operation rate.

It is expected that domestic demand will increase by 4% to 1,565,000 tons, to record a slightly declining expansion tempo compared with the 1989 level. Imports are expected to fall below the preceding year's level and amount to only 58,000 tons, because imports from Latin America and the Middle East will decrease, while there will be an inflow of South Korean products.

On the other hand, exports are expected to increase smoothly and exceed the preceding year's level by nearly 30%, due to the recovery of the Southeast Asian market and the starting of shipments to help Phillips.

The level of production is expected to be at 1,702,000 tons, or slightly less than the official production capacity, and this has connection with such problems as periodic repairs, which in turn are related to the fact that many plants have been overloaded until now.On the other hand, domestic demand for HDPE amounted to 905,000 tons, or 11% more than that in the preceding year.

When demand is broken down by use, it can be seen that for use for film increased, helped by the smooth increase in private consumption.

Also demand for use for nonfilm products, such as pipe and sheet, increased drastically in addition to the firm tone of demand in the fields of injection and blow molding. Production increased by 8.2% to 1,038,000 tons.

Manufacturers of high-density polyethylene think that the situation in 1990 will remain extremely tight.

The reason is that demand is expected to remain firm in spite of a slight decline in the tempo of expansion of domestic demand, while production capacity can hardly be expected to increase because such steps as expansion by debottlenecking and mobilization of idle facilities have already been taken.

An additional reason is that shipments will be increased to help Phillips and others.

Because of such a situation, the manufacturers think that export capacity will decrease sharply. They expect that the export market will rise in reaction, with the resumption of exports on a selective basis.

Production will increase as a resu the skipping of periodic repairs. H ever, the increase will be largely o by the decrease stemming from the version to L-LDPE.

So, production is likely to remai the 1,058,000-ton level, or only 20 tons more than that in 1989.

DRUG MAKERS WANT TAR PRICE TO BE REVISED DIFFERENTLY

The Federation of Pharmace Manufacturers' Associations of J has, with regard to the next drug- adjustment, requested to the directo the Pharmaceutical Affairs and I ance Bureaus of the Ministry of H and Welfare:

(1) the next revision of drug- prices be made in or after June

(2) drug-tariff prices be elevate the lowest price level be pushed

The requests were made after th eration was informed by the minis the recent meeting of Central S Insurance Medical Council of the sion to revise drug-tariff prices time in the same way as for the pre ing revision.

New Developments From Japan

BASED SUPERCONDUCTOR RVES AS MAGNETIC ELDING MATERIAL

ihon Cement Co. and the The nological University of Nagaoka jointly developed magnetic-lding material using bismuth-based -temperature superconductive film. y produced a magnetic-shielding by laminating 42 pieces of 1mm-k, ring-shaped superconductive film g the doctor blade process: the tube sures 20 mm in exterior diameter, m in interior diameter and 42 mm ength. The tube's coefficient of magnetic field in the axial direction ds at 0.16. The critical temperature critical electric-current density of film employed are 103K and A/cm^2, respectively.

hey applied a direct-current magen-ield to the tube from the axial direc- using a Helmholtz coil and sured the magnetic flux density in the tube by means of Hall-effect ents.

s a result, they confirmed that the -shaped magnetic-shielding mater- — when immersed in liquid nitro- — was capable of completely cting a direct-current magnetic field ing a magnetic flux density of 19 ss or less.

n addition, they found that a magne-ield with a magnetic flux density of auss remained within the tube when exterior magnetic flux density was ered from roughly 100 to 0 gauss.

ttrium-based magnetic-shielding erial already developed is capable of ting out magnetism of 20 gauss or . The new product is, therefore, muth-based magnetic-shielding erial comparable with yttrium-based gnetic-shielding material. Magnetic-lding material is one of the promis- applications of high-temperature superconductors, which are lighter and have superb magnetic-shielding properties compared with high magenticpermeability alloys including Permalloy. The private company and university intend to further promote related research in a bid to put the new product into practical use.

MITSUBISHI GAS CHEM. TO ENTER PLASTIC LENS FIELD WITH NEW PRODUCTS

Mitsubishi Gas Chemical Co., has developed new polymers for eyeglass-use plastic lenses having prominent advantages over conventional equivalents, and begun sample shipments to users. Eyeglass-use polymer is a new field the company has been striving to advance into for diversification.

The new polymers are based on new-type radical copolymer having no halogen and other impurities and excellent with regard to balance between reflection rate and Abbe number, and have low specific gravity (1.27) as well as high weatherproofness and strength. In particular, it is said that their Abbe numbers — 50 for medium-reflection-rate lenses and 42 for high-reflection-rate lenses — are far superior to those of the plastic lenses now available on the market.

The company has already developed superhigh-reflection-rate lenses with reflection rate of more than 1.60. It is increasing its efforts for exploiting markets for use in eyeglasses and optical instruments. It began R&D for lens-use polymers around 1985 to utilize chlorostyrene — one of its products and has since developed a number of unique optical-use polymers.

CLINICAL TESTS PLANNED FOR THREE NEW DRUGS

Toyo Jozo Co. is scheduled to inaugurate this year clinical tests on three new drugs — new quinolone-based "KBT" antibacterial agent, an anti-allergic agent and "TOK-8811" immune regulator jointly developed with Kumiai Chemical Industry, Co.

The company has already subjected the following items to clinical trials —"AT-877" cure for cerebral-vessel twitch occuring after a subarachnoidal hemorrhage, "CT-848" cerebral-function ameliorator, "KT-611" cure for low blood pressure and dysuria and an antidepression agent introduced from Pierre Fabre (France). AT-877 was developed in partnership with Asahi Chemical and is now under phase-III clinical tests. All other items have been put into phase-II clinical tests. KT-611 was developed jointly with Kanebo.

Toyo Jozo is due to apply this December to authorities for production approval on AT-877, which will be followed by the three other new drugs. All of them will be put on the market after 1994 one after another.

Todate the company has concentrated on expansion of application fields of drugs already in use. As a result, "Zesulan" anti-allergic agent has come to be applied to treatment of asthma and, in addition, converted to an OTC drug. The company has called on the authorities to approve application of "Bredinin" immune regulator to chronic articular rheumatism and generalized lupus erythematosus.

The company's annual sales for the current fiscal year are projected to amount to ¥82 billion, 60% of which will be accounted for by pharmaceuticals, veterinary drugs and diagnostic agents.

GRAFTED BLOCK POLYMER ACTS AS SOLID-STATE ELECTROLYTE

A research group at College of Engineering, The Technological University of Nagaoka — together with

Shin-Etsu Chemical Co. — has successfully developed new solid-state electrolyte (grafted back polymer) having electrical conductivity of 10^{-6} siemens/cm at room temperature; the value is the highest among those of macromolecular ionic conductors.

The new product is synthesized in the following steps; 3-dimensional styrene/p-hydroxystyrene/styrene (S-HS-S) block polymer is produced by combining styrene monomer with butoxy-styrene monomer using an anionic polymerization process and removing butyl groups from the resultant product; the block polymer is put into tetrahydrofuran and butoxypotassium is added thereto (potassium oxide is thereby obtained) and ethylene oxide is also added; all these chemicals are turned into the above-mentioned grafted block polymer after having reacted with each other at 60°C for 48 hours.

As a graft ratio concerned rises, so does the electrical conductivity of the grafted block polymer. When the weight ratio of the polyethylene-oxide graft in the polymer reaches 62%, the electric conductivity stands at a markedly high level of 10^{-5} siemens/cm, showing that the graft is amorphous and has large free volume. When low-molecular-weight (350) polyethylene oxide is added to the grafted block polymer at the ratio of 15%. the electrical conductivity concerned rises to 10^{-6} siemens/cm. The research group says: (1) the grafted block polymer has a clear microphase-separated structure; (2) the long backbone molecule serves to strengthen the material itself, and (3) the graft component and the back-bone molecule form a continuous phase even if the former's molecular weight is at a comparatively low level.

POLLUTION-FREE TECHNOLOGY PREVENTS MARINE LIFE FROM STICKING TO SHIPS

Mitsubishi Heavy Industries, Ltd. has developed technology that exploits conductive film for preventing marine life from sticking to, for example, ship bodies. In the new technology, conductive paint is coated on the targeted material and a weak electric current is applied to the resultant film so that the electric current can produce antifouling substances on the film surface through the electrolysis of the seawater.

The company has applied for basic and related patents on the new process both at home and abroad. Potential applications of the technology are the inlet channels of thermal power plants, marine structures, wharfs, piers and fish preserves as well as ships.

The said film contains no antifouling agents (organic tin and heavy metals) and, therfore, never causes sea pollu It is thought that the organic tin-b self-polishing-type antifouling p now in use in polluting the sea. conductive film formed using the technology is, the company claims, able of maintaining antifouling eff for a long time.

Till now antifouling paint contai antifouling agents has been coate ship bodies. The agents are dissolve the sea, thus preventing algae and sh from sticking to the ship bodies. pollution caused by antifouling age however, has come to constitute a sc problem.

The company is conducting rel R&D work with the aim of putting new process into practical use sev years hence. It intends to expand ap cation of the technology from sm sized ships to large ones. The cond tive paint concerned was produced w the co-operation of Chugoku Ma Paints Ltd.

WOOD-BASED MATERIALS T BE DEVELOPED AND APPLIE

Forestry Agency of Japan's Mini of Agriculture, Forestry and Fishe will set up a research association new wood-based material developm technology by recruiting 30-odd co panies involved in this arena. The as

n will play a leading role in the y's 4-year project to start in April omoting development of such new naterials. The project is intended lize wood components by apply- dvanced technology to produce naterials to be used for housings lectronic equipment, car interior s, housing, construction and pack- materials as well as new type and sophisticated parts.

e research association will tackle ermoplasticization and liquefac- f wood components, development ated test plants and their applica- echnology, and development of ology, for advanced utilization of wood components. An agency al says the recent progress is basic ch on wood, particularly on a ular level, will certainly make work successful.

od itself has good properties such h strength and a comfortable feel, he advantage that it produces no ul gas when burned. However, it thermoplasticity and solvent sol- , and its processing methods are d to cutting and adhesion in con- the great many process methods able to metals and plastics.

s believed that wood will be ed thermoplasticity by application rification (benzylification, cyan- ification, etc.) and esterification ylification); it is also possible to wood by using various chemi- ich as phenol, polyhydric alco- oxyethers and some chemical ers. These efforts will bring about pe materials having properties and plastics lack.

research association will also orward with R&D on and appli- of the technology established by ncy's other research associations regard to xylosaccharide and Their target application is low- sweeteners, functional foodstuffs, omagnetic wave-interference materials and some sophisticated parts for their aircraft and spacecraft.

The agency has so far established four research associations aimed at developing new wood-utilization technology.

ASAHI YUKIZAI UNVEILS WORLD'S LARGEST CALIBER PLASTIC VALVE

Asahi Yukizai Kogyo Co., Ltd recently succeeded in developing the world's largest 1,500mm-caliber plastic valve, and started exploiting a new market mostly for nine items of large caliber FRP butterfly valve of 700mm or larger size.

The valve is made of plastic — FRP for the valve disc and body, and EPDM for the sheet used. The new product has already been introduced for agricultural water applications at the Hokkaido Sorachi City Office. The company is eager to open up markets especially with regard to place liable to suffer corrosion and peat-fog.

It has been considered hard to make large-caliber plastic valves due to problems related to strength. The company, however, has developed large-caliber valves of 700mm or more by combining high-strength plastic materials like FRP, "thick" designs and advanced processing technology, and produced the 1,500mm caliber valve, the largest plastic valve in the world.

As a result, the company already has nine different sizes of large-caliber butterfly valves made of FRP: 700mm, 800mm, 850mm, 900mm, 1,000mm, 1,100mm, 1,200mm, 1,350mm, and 1,500mm.

The features are: (1) excellent chemical resistance and anti electrical erosion (2) far lighter than metal products (3) excellent water-tightness (4) less flow

resistance and likelihood of needing rectification due to the streamlined shape of the concentric valve (5) anticorrosive property, long life and easy maintenance.

JAPAN, U.S. FIRMS TIE UP FOR METAL SURFACE TREATMENT

Nihon Parkerizing Co. has signed a 10-year technical co-operation contract with Henkel Corp. (U.S.) with regard to chemical anticorrosive treatment of metal. The technical tie-up allows the Japanese company to introduce from Amchem Products — Henkel's subsidiary — technology for treating the surface of beverage cans. Nihon Parkerizing has hitherto been rather weak in the business operations concerned.

The technical contract will help the Japanese firm gather market information in the States and pioneer metal-surface-treatment technology on the basis of Amchem's techniques.

Henkel, for its own part, will supply technical service orginating from the Japanese company to Japanese iron/steel and car makers who have inaugurated production activities abroad.

Back of the technical tie-up between the two companies is the fact that the U.S. firm integrated last year its two subsidiaries — Amchem and Parker Chemical. Amchem commands an overwhelmingly large market share in the U.S. in surface treament of drink cans.

Parker is also an influential company tackling surface treatment of iron/steel, automobiles and household electrical appliances.

Nihon Parkerizing and Henkel have geamed up with each other since 1928 and have now enhanced their co-operation in response to the unification of the said two subsidiaries. The ...anese company is considered thrus... much more deeply into the dome... market for surface treatment of d... cans which market has size estimate... ¥3,000 million year.

THERMAL STIMULUS-RESPONDING GEL PIONEER... MITI AGENCY

Research Institute for Polymers... Textiles attached to MITI's Agenc... Industrial Science and Technology... successfully developed ther... stimulus-responsive macromolecula... fiber (diameter: 400 microns) by s... ning aqueous solution of polyv... methyl ether (PVME) into fib... material and applying gamma... thereupon for cross-linking purpo...

When heated to 38°C, the new ... duct shrinks to half its original le... within roughly 0.1 of a second: a si... fiber produces shrinkage stress of 0.... A bundle of 1,000 fibers has the stre... needed for lifting a small-sized ca... beer.

The institute has produced the ... material by capitalising on PVE... unique properties of dissolving in ... water and settling in warm w... Application of gamma rays is aime... endowing the fibrous material with... capability of swelling/shrinking ... reversible manner at its shape-trans... point (38°C).

The Institute has produced fine... fiber having high-level responsive... taking into account that the respons... ness is in inverse proportion to... square of the volume of the gel ... cerned.

Muscle is typical stimulus-respon... material and shape-memory alloy is... categorised as such material. Rec... developed biomimetics-applied gel... capable of responding to a few type... stimuli including magnetic fields... solvents and changes in pH.

MARKET INFORMATION

Market Steady

otests against entry tax caused ‹et to remain closed for two days ombay. Activities were further ced on account of Assembly elections. Market activity is expected to remain low, pending the Budget and anticipated changes in the import prices.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on February 27, 1990)

STRIAL CHEMICALS	Per Kg.
nium sulphate	2.50
nium phosphate (Mono)	14.50
nium phosphate (Di)	14.50
nium carbonate (Di)	17.00
nium bicarbonate	6.00
nium chloride	3.25
nium nitrate	6.00
c white powder	25.00
mide (Resale)	71.00
carbonate	13.00
ing powder (33% Cl)	5.00
Borax (Granular)	17.50
Borax (Powder)	22.00
Boric acid (Tech)	26.00
Bisphenol-A	75.00
Butyl carbitol	110.00
Caustic soda (Flakes)	11.50
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	6.00
Calcium carbonate (Activated)	5.75
Cobalt oxide	300.00
Cresylic acid	62.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	44.00
Copper sulphate	26.00
Chromic acid	63.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	116.00
Hydro	35+ST

Hyflosupercell	22.00
Hexamine (Resale)	34.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	39.00
Lithopone	19.00
Magnesium chloride (Crystal)	2.00
Menthol crystal (Flakes)	355+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	30.00
Magnesium carbonate (Indian)	26.00
Maleic Anhydride (Resale)	42.00
Mercury (34.5 Kgs)	11,500.00
Nickel chloride	110.00
Oxalic acid (Resale)	17.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	26.00
Potassium carbonate (Imported)	36.00
Potassium bichromate	33.00
Potassium phosphate (Mono)	34.00
Potassium phosphate (Di)	25.00
Polyvinyl alcohol (No. 117)	115.00
Polyvinyl alcohol (No. 173)	117.00
Polyvinyl alcohol (No. 208)	120.00
Paraformaldehyde (Resale)	25.00
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	49.00
Paraffin wax	19+ST
Rangolite (German)	96+ST
Rangolite (Czech.)	70.00
Sodium sulphate (Fine)	3.75
Sodium sulphate (Coarse)	3.90
Sodium sulphide 50-52% (Flakes)	11.50+ST
Sodium sulphide 58-60% (Flakes) (TCL)	25.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	730.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	4.90
Soda Ash (Birla)	4.30
Soda Ash (Imp.)	4.50
Sodium bicarbonate	6.00
Sodium bisulphite	8.00
Sodium silicate	5.50
Sodium acetate	7.20
Sodium alginate	420.00
Titanium Dioxide (Anatase)	80.00
Titanium Dioxide (Rutile – RCR_2)	118+ST
Tartaric acid	109.00
Trisodium phosphate	12.00
Thiourea	84.00
Urea (Tech.)	3.00
Vacuum salt	1.00
Zinc Dust	52.00
Zinc Oxide	57.00
Zinc chloride powder (Tech.)	20.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.00
Acetic Anhydride (Resale)	36.00
Acetone (Resale)	17.00
Adipic Acid	70.00
Aceto Acetanilide	55.00
Aniline Oil	50.00
Benzoate Plasticiser	62.00
Butyl acrylate	84+ST
Butyl stearate	38.00
Butanol	3
Benzyl Alcohol	6
Benzyl Chloride	3
Benzo trichloride	1
Benzoyl chloride	2
Bromine Liquid	6
Chloroform	2
Carbon Tetrachloride	1
Cellosolve	6
Cyclohexanone	5
Cyclohexanol	58
Diacetone (Resale)	2
Diethyl Oxalate	3
Diethyl glycol (DEG)	2
Dioctyl Phthalate	4
Diallyl Phthalate	4
Dimethyl Phthalate	2
Dioctyl Adipate	5
Dibutyl Adipate	4
Dipentene	1
Dimethylamine 40%	5
Dimethylamine 50%	5
Ethyl Acetate	2
Ethyl Acrylate	7
Ethylene Dichloride	1
Ethylene Glycol	3
Formic Acid (Imp.)	2
Formaldehyde (Resale)	
Glycerine (CP)	5
Glycerine (IW)	5
Hydrogen Peroxide 50% (Resale)	2
Isopropyl Alcohol	3
Isobutyl Alcohol (Resale)	3
Monoethanolamine (Resale)	[illegible]
Melamine	[illegible]
Methyl Ethyl Ketone	[illegible]
Methyl Isobutyl Ketone	[illegible]
Methyl Acrylate	[illegible]
Methylene Dichloride (Resale)	

Carbitol	64+ST
Meta Cresol	45.00
Nitrobenzene	19.00
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	35.00
Propylene Glycol	50.00
Polyethylene Glycol (No.200)	58.00
Polyethylene Glycol (No.400)	60.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	80.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	45+ST
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	28.00
Triethanolamine (Resale)	88.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	50.00

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	12.50
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	11.00
Xylene	21.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)	
Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	170.00
Aceto Acetic Ester (Methyl)	72.00
Ammonium Molybdate	210.00
Anthraquinone	145.00
Anthranilic Acid	78.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	350.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	95.00
Bromamine Acid	550.00
BON Acid	130+Ex+Ta
Chicago Acid (Atul)	355.00
Coach Acid	52.00
C. Acid (Imp.)	210.00
Cyanuric Chloride	150.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	75.00
Diethyl Aniline	160.00
Diamino stilbene disulphonic acid	168.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	205.00
H. Acid (Atul)	115.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	350.00
J. Acid Urea	410.00
K. Acid	125.00
MPDS (German)	185.00
MNA	1
Meta Ureido Aniline	23
MPD (Local)	20
MPD (Japan)	24
Naphthenic Acid	2
N-Methyl J. Acid	58
N-Methyl Aniline	12
Naphthalene (Refined)	2
Ortho Anisidine (OA) (Imp.)	10
Ortho Dichloro Benzene (ODCB)	2
OT Base	13
Para Dichloro Benzene (PDCB)	3
Para Anisidine (PA local)	16
PNA	12
Para Cresidine (Imp.)	41
Para Amino Azo Benzene (India)	15
PNCB	6
Para Amino Acetanilide	19
1-Phenyl 3-Methyl 5-Pyrazolone	14
Phenyl J. Acid	34
Para Amino Benzoic Acid	16
PT Base	14
Rhoduline Acid	55
Resist Salt 80%	2
Resorcinol	19
Sodium Naphthionate	6
5-Sulpho-Anthranilic Acid	8
Sulphanilic Acid	3
Sulpho Tobias Acid	16
Trichloro Benzene (TCB)	2
Tobias Acid	16
Metanilic Acid	4
MTD	12

Bombay Dyes Market

(Prices as on February 27, 1990)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	42
Red FB	42
Red Violet FBL	62
Orange 3R	25
Violet 3R	37
Violet RL	35
Violet 6R	63
Scarlet RR	28
Rubine 3B	28
Rubine CB	44
Blue GL	41
Blue BGF	80
Navy Blue RE	35
Brown 3REL	27
Black GEL	42
Dark Brown 3B	41

BASE COLOURS	Per
Fast Yellow GC	7
Fast Orange GC	12
Fast Scarlet R	19
Fast Scarlet RC	12
Fast Scarlet RCR	10
Fast Scarlet G	11
Fast Scarlet GN	9
Fast Scarlet GG	7
Fast Scarlet GGS	7
Fast Red B	23
Fast Red RC	11
Fast Red R Flakes	15
Fast Red TR	181
Fast Red TR Oil	22
Fast Red RL	251
Fast Red KB Oil	251
Fast Bordeaux GP	23
Fast Garnet GBC	10
Fast Violet B	54
Fast Blue BB	56

NAPHTHOL COLOURS	Per
ASG	301
AS	20
ASSW	37
ASBS	25
ASBO	26
ASD	20
ASOL	24

	369.00
I	336.05
	236 00
	249.95
	2002.35
	2459.45
G	143.00
	538.65
	652.60

CION COLOURS	Per Kg.
en Yellow HR	207.95
Yellow H4G	145.65
a Yellow H 8GP	168.55
Yellow HE6G	214.75
w G-E4R	276.05
Yellow H7G	332.30
w M4R	275.45
w MGR	387.65
Yellow M4G	201.15
Yellow M8G	366.10
w M3R	244.70
Orange H2R	303.80
Red H7B	157.95
Orange M2R	313.15
Red H8B	213.55
Scarlet H RN	245.05
a Red H-3BP	179.80
Red H-F3B	243.45
Magenta HB	182.00
Red M 5B	160.05
Red M 8B	218.35
Pink MB	137.10
Magenta MB	163.65
Purple H-3R	219.55
Purple H-7R	175.40
Blue H 3R	333.75
Blue H-GR	406.40
Blue H5G	207.95
H 5RX	286.20
Blue H 7G	213.95
Blue H 7RX	358.15
uoise HA	265.05
a Blue H-3RP	595.30
a Turquoise H 2G P	181 50

Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818 60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693 85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827 05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779 85
Brown R Pdr. Fine	869 45
Dark Brown 3R Fine	826.25
Brown G Supra Disp	582 05
Brown 2G Supra Disp	716.10
Brown R Supra Disp	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp	529.00
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574 70
Direct Black CH Supra Disp.	[illegible]30.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: FEB. 23, (NNS) Phosphoric acid went up sharply from Rs. 1,050 to Rs. 1,300 per 50 kg in the Delhi chemicals market during the week under review in view of dwindling supply as well as hike in its prices by manufacturers. In the absence of fresh supply as well as increased mutual speculation between stockists, titanium dioxide anatase and RC-822 spurted sharply by Rs. 6/8 at Rs. 80 and Rs. 102 per kg respectively. Titanium dioxide K-brand of Calcutta side traded higher at Rs. 73 instead of Rs. 72. Mercury, on the other hand, dropped sharply by Rs. 300 at Rs. 11,200 per flask on account of slack demand as well as increased offerings. On reports that about 16 tonnes of imported rangolite despatched from Bombay to Delhi, prices of rangolite slipped by Rs. 7 at Rs. 83. Sufolite eased by Re. 1 at Rs. 66. After an initial improvement, prices of chatkolite ruled quiet at Rs. 53.50.

Sodium nitrite tumbled down by Rs. 50 at Rs. 900/950 in view of improved supply and fall in demand. Soda bicarb NAL suffered a fall of Rs. 10 at Rs. 300 thanks to better supply. Caustic soda flakes eased by Rs. 5 at Rs. 510 per 50 kg and ammonia bicarb declined from Rs. 145 to Rs. 136 per 25 kg on withdrawal of buying support. As a result of slack demand from cold drinks units, citric acid (Chinese) moved down by Rs. 20 at Rs. 2,060 while citric acid Bombay Dyeing remained steady at its previous level of Rs. 2,450 on account of scanty supply as well as shortage of stock.

Camphor powder rose by Re. 1 at Rs. 96 per kg in the wake of good festival demand. Camphor thal held steady at Rs. 104. Paraffin wax recorded a rise of Rs. 25 at Rs. 875 per 50 kg in view of continued increased demand by stockists. Slacks wax advanced from Rs. 8,300 to Rs. 8,500 per tonne. Due to acute shortage of stock borax crystal flared up by Rs. 65 at Rs. 900. Prices of menthol remained unchanged during the week.

Due to fall in import from France alongwith keen seasonal consumption, tartaric acid France advanced by Rs. 4 at Rs. 320 per kg. Desi tartaric acid Swastik brand was quoted at Rs. 250. No noticeable variation was reported in the prices of dyes and colours during the week.

(DELHI MARKET RATES AS ON FEBRUARY 23, 1990)

Ammonia Bicarb (Per 25 Kg.)	136.00
Mercury (Per flask)	11,200.00
Soda ash (Per bag)	340/357.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	510.00
Citric acid (Per 50 Kg.)	2,060/2,450.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCl (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	290/300.00
Sodium Hydrosulphite (Per Kg.)	34.00/36.50
Rangolite (Per Kg.)	83.00
Tartaric acid France (Per Kg.)	320.00
Sufolite (per Kg.)	66.00
Chatkolite (per Kg.)	53.50
DMO	125.00
Boric acid Technical (Per 50 Kg.)	1,325.00
Paraffin Wax (Per 50 Kg.)	875.00
Tartaric Acid (Swastik Per Kg.)	250.00
Borax Granular (Per 50 Kg.)	835.00
Borax Crystal (Per 50 Kg.)	900.00
Sodium Nitrite (Per 50 Kg.)	900/950.00
Sodium Nitrate (Per 50 Kg.)	440.00
Camphor Thal (Per Kg.)	104.00
Camphor Powder (Per Kg.)	96.00
Menthol Bold (Per Kg.)	400.00
Menthol Medium (Per Kg.)	380.00
Menthol Flake (Per Kg.)	
Menthol Oil (Per Kg.)	245/
Glycerine (Per Kg.)	5
Sodium Silicate (Per quintal)	275/
Hexamine (Per Kg.)	
Acetic Acid Glacial (Per Kg.)	
Copper Sulphate (Per quintal)	2,40
Formic Acid (Per Kg.)	
Formaldehyde (Per Kg.)	
Hydrogen Peroxide (Per Kg.)	26.7
Calcium Carbonate (Per Tonne)	2,50
Acid Slurry Soft (Per Kg.)	
Acid Slurry Hard (Per Kg.)	
Phosphoric Acid (Per 50 Kg.)	1,
Potassium Nitrate (Per quintal)	900/1,
Potassium Permanganate (Per 50 Kg.)	2,800/3,
Sodium Bichromate (Per 50 Kg.)	1,575/1,
Trisodium Phosphate (50 Kg.)	
Titanium Dioxide Anatase (Per Kg.)	
Titanium Dioxide RC-822 (Per Kg.)	
Titanium Dioxide K-Brand (Per Kg.)	
Titanium Dioxide RCR-2 (Per Kg.)	
Zinc Oxide (Per metric tonne)	42,000/48,
Phenol Carbolic Acid (Per Kg.)	
Carbon Tetrachloride (Per Kg.)	
Chloroform (Per Kg.)	
Sodium Sulphate (Per metric tonne)	3,400/3,
Naphthalene Balls (Per 50 Kg.)	1,

DYES & COLOURS	(P
Naphthol AS	175/
Naphthol ASG	180/
Naphthol ASBS	210/
Naphthol ASTR	275/
Naphthol ASOL	210/
Naphthol ASBO	195/

DIRECT DYES	(P
Black E. Conc.	120/
Diazo Black B.T.	105/
Green B	90/
Blue 2-B	60/
Blue 2-B 225% (JNR)	
Sky Blue FB	160/
Basic Auramine	5
Basic Rhodamine	30
Basic Methylene Blue	10
Basic Violet	165/
Basic Malachite Green	
Acid Orange	75
Congo Red H/C	75

Madras Market

kets were firm without much es in the prices in the Madras cals market. Though the finan- rcles have predicted a period d fortune for handloom indus- h a massive help forthcoming the Government. The exact details and its impact are awaited. Since handlooms are a major consumers of dyes and chemicals in the southern region its prosperity will be reflected in the market. The consumption levels of the various items are being maintained.

MADRAS MARKET RATES AS ON FEBRUARY 24, 1990)

cid Glacial (per kg)	15.00
um Sulphate Iron free (MT)	3,500.00
ium Bicarbonate (5 kgs)	150.00
ium Chloride (per MT)	3,000.00
rry (per kg)	31.00
Carbonate (per kg)	8.50
Chloride (per kg)	7.50
id Technical (per kg)	25.00
g Powder (per 50 kgs)	220.00
er 50 kgs)	735.00
Soda Flakes – Mettur icals (per MT)	10,800.00
Soda Flakes – Andhra s (per MT)	10,800.00
Chloride 70% Solid (MT)	3,000.00
Chloride Anhydrous (MT)	5,500.00
Carbonate (Activated) (MT)	6,000.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	49.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	135.00
Pure Para Cresol 96% (per kg)	85.00
Meta Para Cresol 42% (per kg)	50.00
Formic Acid (per kg)	26.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	53.00
Hydrosulphite of Soda (TCPL) (per kg)	38.00
Hydrosulphite of Soda (IDI) (per kg)	42.00
Hydrosulphite of Soda (BASF) (per kg)	42.00
Hexamine (per kg)	31.00
Hyflosupercell (per kg)	19.50
Hydrogen Peroxide (per kg)	31.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	38.00
Magnesium Carbonate (per kg)	17.50
Magnesium Chloride (per kg)	3.25
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	345.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	17.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	25.00
Polyvinyl Alcohol Powder (per kg)	125.00
Pentaerythritol (per kg)	50.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	360.00
Soda Ash (TATA) (per 75 kgs)	360.00
Sodium Bicarbonate (TATA) (per 50 kgs)	370.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	14.00
Sodium Bisulphite (per kg)	7.50
Sodium Alginate (per kg)	280.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	3.50
Titanium Dioxide (Anatase) (per kg)	75.00
Titanium Dioxide (Rutile) (per kg)	95.00
Trisodium Phosphate (per kg)	11.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	50.00
Zinc Chloride Powder (per kg)	12.50
Zinc Sulphate (per kg)	8.00

SOLVENTS

Acetone -- HOCL (per kg)	18.50
Butanol (per kg)	35.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	14.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	20.00
Chloroform (per kg)	29.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	36.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	45.00
Di-N-butyl Phthalate (per kg)	44.50
Ethyl Acetate (per kg)	22.00
Isopropyl Alcohol (per kg)	29.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	21.00
Methyl Ethyl Ketone (per kg)	34.00
Methyl Isobutyl Ketone (per kg)	42.00
Phenol (per kg)	39.00
Sorbitol (per kg)	13.00
Triethanolamine (per kg)	90.00
Trichloroethylene (per kg)	25.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	15.00
Xylene (per lit)	21.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	App sailir (:
11/3	CMB Merit	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans; Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli).	13
3/3	Maersk Clementine (Sing)(V-9005)	Volkart Fleming	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chicago; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit; Minneapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; San Francisco; Portland; Longbeach; Mexican and S. American ports. (Carting at M.O.D. No. 2).	7
5/3	Ever Bridge (Voy-025)	Greenways	Norfolk; New York; Newark; Baltimore; Charleston; New Orleans; Houston; Boston; Providence (RI): Philadelphia; Norfolk; Savannah; Jacksonville; Wilmington; Miami; Montreal; Toronto; Bermuda; Los Angeles; Longbeach; San Francisco; Oakland; San Diego; Stockton; Richmond; Almenda; Redwood City; Sacramento; Seattle; Portland; Vancouver (B.C.); Tacoma; Longview; Chicago; Dallas; various inland destinations and Caribbean ports. (Carting at G/H Cotton Depot).	10
		Trident	New York; Norfolk; Savannah; Baltimore; Boston; Charleston; Houston.	
5/3	Kapitan Kud	Marathon	Boston; New York; Baltimore; Norfolk. (Carting at T.P. No. 3).	8
6/3	Kabirdas (Ind)	S.C.I.	New York; Baltimore; Savannah (Direct) and other inland destinations. (Carting at Timber Pond no. 1).	10
11/3	CMB Merit	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at Kalamboli).	13
3/3	Maersk Clementine	V. Fleming	Lagos/Apapa; Dakar; Freetown; Monrovia; Lome; Cotonou; Doula; Tema. (Carting at M.O.D. No. 2).	7.
1/3	Dorothee	Merzario	Dakar; Abidjan; Monrovia; Lome, Douala; P. Noire; Matadi; Libreville; Cotonou; P. Gentil; Lagos; P. Harcourt; Warri; Freetown; Conakry; Louanda; Nouakchott; Guinea; Blassa. (Carting at M.O.D. No. 1).	8.
11/3	CMB Merit	C.M.B.	Djibouti; Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona, Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Carting at Kalamboli).	13
1/3	Dorothee	Samrat/ Hindustan/ Merzario/	Felixstowe; Hamburg; Rotterdam. Also London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembley; Birmingham; Leicester; Le Havre; Bremen; Amsterdam; Antwerp; Copenhagen; Leeds; Aarhus; Gothenburg; Oslo; Helsinki; Stockholm; Belfast and all inland destinations in U.K., Benelux; Germany; Italy; France; Switzerland and Austria. (Carting at M.O.D. No. 1 for Merzario) (Carting at M.O.D. No. 2 and B. Pier Extn. for Samrat & Hindustan).	8.
3/3	Maersk Clementine	Volkart Fleming	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K. & Scandinavian ports. (Carting at M.O.D. No. 3).	7.
5/3	Volosko (Yug)	Oceanic	Jeddah; P. Said; Rijeka.	12
5/3	Ever Bridge (V-025)(Pan)	Greenways	Hamburg; Felixstowe; Rotterdam; Antwerp; Le Havre; London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembley; Birmingham; Leeds; Leicester; Amsterdam; Bremen; Copenhagen; Aarhus; Gothenburg; Oslo; Stockholm; Helsinki; Belfast and all destinations in U.K.; Germany; Switzerland & Austria. (Carting at G/H Cotton Depot).	10
6/3	Kabirdas (Ind)	S.C.I.	P. Said; Felixstowe; Hamburg; Rotterdam; Antwerp; Bremen; Liverpool; Le Havre; Manchester; Avonmouth; London; Belfast; Aarhus; Oslo; Helsinki; Copenhagen; Gothenburg and all inland destinations. (Carting at T.P. No. 3).	1

(2)	(3)	(4)	(5)
Brest (Rus)	Transocean	Odessa; Illyichevsk; Havana; (Cuba); Genoa; Trieste; Piraeus; Marseilles; Barcelona; Varna; Bourgas. (Carting at Timber Pond No. 3).	11/3
Ever Bridge	Greenways	Colombo. (Carting at G/H Cotton Depot).	10/3
Brest	Transocean	Afghanistan. (Carting at Timber Pond No. 3).	11/3
S/o. Nagaland (Ind).	S.C.I.	Singapore; Penang & Main Japan ports. (Carting at Timber Pond No. 1).	9/3
Maersk Clementine (Sing)(V-9005)	Volkart Fleming	Penang; Singapore; Hongkong; Keelung; Kaohsiung; Busan; Main Japan Ports; Manila; Jakarta; Surabaya; Bangkok; P. Kelang; Chinese Ports. (Carting at M.O.D. No. 2).	7/3
E. Yaroslavskiy	Transocean	Singapore; Main Japan Ports.	13/3
Maersk Clementine	V. Fleming	Dubai; Dammam; Muscat; Bahrain; Kuwait; Riyadh; Doha. (Carting at M.O.D. No. 2).	7/3
Al Zahraa (Iraqi)	Al Rafidain	Umm Qaser.	10/3
Al Foudia	Samarth	Dubai; Dammam; Kuwait; Bahrain.	10/3
Ardal (V-11)	Mackintosh	Dubai; Muscat. (Carting at 5/6-VD).	10/3

VESSELS DUE FOR IMPORT DISCHARGE

Date	Seamer's Name	Agents	From
	Dadi	Sai Ship	Brazil
	Ind Renown	I.S.S. Co.	U.K. Cont.
	Kranj	Depe	Far East
	Medipas Wave	L. Triest/Hindustan	Med. Ports.
	Moscenice	Oceanic	Adriatic Ports.
	Rumija	S.C.I.	U.K. Cont.
	Westman	Sai Ship	Brazil

ATTENTION ALL READERS

PLEASE LET US KNOW WHAT NEW FEATURES YOU WOULD LIKE US TO INCORPORATE OR WHICH FEATURES YOU FIND REDUNDANT. YOUR PROMPT REPLY WILL BE HIGHLY APPRECIATED.

Address all letters to
The Editor

CHEMICAL WEEKLY

306, Shri Hanuman Industrial Estate,
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Bombay 400 031.

HELP US TO SERVE YOU BETTER

Materials Imported

IATERIALS IMPORTED BOMBAY
(From 4.1.90 to 8.1.90)

)PROPYL ALCOHOL: From ın: Allana Pharma Chem. Ltd., MTs., Rs. 1,67,238; Daffodil ıaceuticals Pvt. Ltd., 12.8 MTs., ,63,845.

CTIC ACID MIN. 90% BP/USP: Spain: United Chemicals, NA, 45,189.

NCOZEB TECH.: From Nether- Northern Minerals Ltd., 7,200 Rs. 31,16,568.

THYL ETHYL KETONE: From : Bhor Inds. Ltd., 13.6 MTs., ,264.

IETHYL NAPHTHALENE: FRG: Honest Pharma Chem, Kgs., Rs. 69,489.

LYBDENUM TRIOXIDE: FRG: Rajesh Enterprises, 500 Rs. 73,923.

NOMETHYL ACETO ACET- E 70%: From FRG: Hindustan Geigy, 10,878 Kgs., ,92,144.

NAPHTHOQUINONE: From PG Chemicals Pvt. Ltd., 2,500 Rs. 2,31,056.

PENTYL GLYCOL: From Sumeeta Laboratories, 4,000 s. 96,979.

OIC ACID: From Japan: Ary- Chemicals Pvt. Ltd., NA, 6,803.

ALPHA PHENYL GLYCINE RIDE HCL: From Netherlands: Lyka Org. Ltd., 57,750 Kgs., 24,692; Pharmachem, 1,505 s. 6,00,672; Supriya Drugs & aceuticals, 5,040 Kgs., 31,222.

HA PHENYL GLYCINE IDE HCl: From Spain: Gujarat Lyka Organics Ltd., 6,400 Kgs., Rs. 23,84,751.

PHENYL PROPANOLAMINE HCl USP/BP: From Japan: Dilip Kumar & Co., NA, Rs. 38,136.

PIPERONYL BUTOXIDE: From Japan: Transelecktra Domestic Products, 2,000 Kgs., Rs. 3,22,328.

POLYVINYL CHLORIDE: From USA: Kaamakhya Udyog Pvt. Ltd., 99.928 MTs., Rs. 10,19,892; From Japan: Pace Marketing Specialities Ltd., 17.5 MTs., Rs. 7,57,500.

POLYVINYL ALCOHOL: From Japan: Shriram Vinyl & Chem. Inds., 4,000 Kgs., Rs. 2,42,026.

POTASSIUM CHLORIDE: From Canada: Atul Products, NA, Rs. 1,03,27,392.

POVIDONE USP: From FRG: Bombay Drug House Pvt. Ltd., 1,000 Kgs., Rs. 1,77,912.

N-PROPANOL: From USA: Ranbaxy Labs Ltd., 13,200 Kgs., Rs. 2,67,775.

PROPIONIC ANHYDRIDE: From Japan: Alembic Chemical Works Ltd., 3,060 Kgs., Rs. 1,29,459; Rathi Dye Chem Private Limited, 1,080 Kgs., Rs. 47,622.

PROPYLENE GLYCOL USP: From FRG: Atic Industries Ltd., 4,940 Kgs., Rs. 3,48,918; From Singapore: Wockhardt Ltd., 17,200 Kgs., Rs. 3,25,266.

PROPYLENE OXIDE: From FRG: BASF (I) Ltd., 3,520 Kgs., Rs. 86,808.

RESORCINOL: From Japan: Shilpa Intl., 5,000 Kgs., Rs. 3,39,925.

SODIUM LAURYL SULPHATE: From FRG: Mehta Dye Chem, 10,000 Kgs., Rs. 3,87,496.

SODIUM SULPHOXYLATE FORMALDEHYDE: From China: D.R. Corpn., NA, Rs. 2,33,867.

STRONTIUM CARBONATE:

From FRG: Morris Electronics Ltd., 11,750 Kgs., Rs. 3,53,323.

TETRAHYDROFURAN: From FRG: S.D. Fine Chem. Private Limited, 2,880 Kgs., Rs. 1,65,383.

THIOUREA: From Japan: Wadhwa Pharmochem Pvt. Ltd., 500 Kgs., Rs. 1,84,409.

TITANIUM DIOXIDE: From China: Steel Strips Ltd., 27.5 MTs., Rs. 8,86,831; Western Comm. Corpn., 7.5 MTs., Rs. 4,81,302; From FRG: Pudumjee Pulp & Paper Mills Ltd., 36.242 MTs., Rs. 19,04,988; From USA: New Plastomer India Ltd., 14.742 Mts., Rs. 6,13,867.

TITANIUM DIOXIDE RUTILE: From USA: Tripathi & Co., 18,144 Kgs., Rs. 8,08,992.

TOLUENE DIISOCYANATE: From FRG: Resins & Plastics Ltd., 5,000 Kgs., Rs. 1,99,705; VCM Polymethanes Pvt. Ltd., 1,500 Kgs., Rs. 59,912; Vishal Plastic Inds., 10 MTs., Rs. 1,41,514.

TRIBUTYL AMINE: From FRG: B.R. Labs, 15 Kgs., Rs. 49,981.

TRIETHYLENE GLYCOL: From Japan: Himatlal H. Joshi, 5,075 Kgs., Rs. 60,348; Shree Synthetics Ltd., 5.175 MTs., Rs. 1,62,717.

TRIMELLITIC ANHYDRIDE: From USA: Indo Nippon Chemical Company Limited, 16,330 Kgs., Rs. 6,88,346.

3,4,5 TRIMETHOXY BENZALDEHYDE: From China: Marvel Drugs Private Limited, 1,000 Kgs., Rs. 4,22,911; From France: New Generic Drug House Ltd., 2,500 Kgs., Rs. 10,10,000.

3,4,5 TRIMETHOXY BENZALDEHYDE 99% MIN. BP 80: From China: Zora Pharma Pvt. Ltd., 2 MTs., Rs. 7,48,853.

TRIMETHYL PHENOL: From FRG: E. Merck India Ltd., 4,940 Kg Rs. 5,29,936.

VANADIUM PENTOXIDE CA ALYST: From USA: Atul Produ Ltd., NA, Rs. 2,88,936.

ZINC OXIDE POWDER: Fr USA: Elpro International Ltd., 1,(Lbs., Rs. 2,14,664.

DRUG MATERIALS IMPORTE BOMBAY (From 4.1.90 to 8.1.90)

D-CALCIUM PANTOTHENA USP: From Japan: Dilip Kumar & (9,000 Kgs., Rs. 1,92,738; From Jap Glindia Limited, 2,200 K Rs. 5,14,728.

CALCIUM D PANTOTHENA IP/USP: From FRG: E. Merck I Ltd., 500 Kgs., Rs. 1,20,340.

CYCLOHEXYLISOCYANA From FRG: Boehringer Knoll Ltd., Kgs., Rs. 2,11,801.

ERYTHROMYCIN THIOC NATE: From USA: Chemifine, 98 Kgs., Rs. 11,37,632.

FURAZOLIDONE BP 80: F China: Malav Agencies, 1,000 I Rs. 1,18,679; Noble Chemie, 1 Kgs., Rs. 1,18,679; N. Aravind & 2,000 Kgs., Rs. 2,67,875.

FURAZOLIDONE USP/NF: F Hungary: J. Punamchand & Co., 1 Kgs., 1,36,818.

PYREMETHANIN BP 80: I China: Turakhia Bros., 100 Rs. 42,588.

SULPHADIAZINE BP 80: I China: Malav Agencies, 500 Rs. 1,10,476; Noble Chemie, 500 Rs. 1,10,476.

SULPHADIAZINE BP/IP: Hong Kong: Gorang Intl., 1,000 Rs. 2,11,927.

SULPHADOXINE: From C Lupin Labs & Co., 200 Rs. 2,33,967.

PLASTIC MATERIALS IMPORTED BOMBAY (From 4.1.90 to 8.1.90)

DPE: From Japan: Ecoplast Pvt. 16.5 MTs., Rs. 2,25,321; Fibroza 17 MTs., Rs. 2,26,592; Mulchand hah, 15 MTs., Rs. 1,96,188; RCF 20 MTs., Rs. 2,62,664; From Arabia: Associated Plastic Inds.,, 25 MTs., Rs. 17,55,737; Fibro Corpn., 137.2 MTs., 4,24,104; National Products, 0 Kgs., Rs. 5,46,853; Raheja Merle Corpn., 34.30 MTs., ,48,148; Shalimar Pack, 51,450 Rs. 6,64,586; Vishal Plast Enter-, 33 MTs., Rs. 3,78,590; From en: Hindustan Cables Limited, 050 Kgs., Rs. 33,45,225; From Plast Fab., 189.375 MTs., 3,17,634; Sumitra Plastics Ltd., Rs. 8,33,626; From Yugoslavia: sh Overseas Corpn., 45,000 Kgs., ,98,195; Bundy Tubing of India NA, Rs. 3,33,557; Columbia Leas- & Finance Ltd., 125 MTs., 41,83,750; Polychronic Industries, Ts., Rs. 13,37,084; Pratik Over- Corpn., 45 MTs., Rs. 5,95,785; Star Plastic P. Ltd., NA, 3,30,370; Shah Patel & Co., 36 Rs. 4,79,992; Steadfast Holding L., NA, Rs. 13,30,330.

PE: From Korea: Polychronic 50 MTs., Rs. 6,30,825; Union y Plastics, 25 MTs., Rs. 3,15,655; Qatar: Barrier Film P. Ltd., Kgs., Rs. 8,73,671; Mehta ries, 33,000 Kgs., Rs. 4,42,509; cs. Ltd., 16.5 MTs., Rs. 2,15,937; Sweden: Universal Cables Ltd., Ts., Rs. 8,11,607; From USA: Plastic Ind. P. Ltd., 33 MTs., 50,303; Pan Asia Intl. P. Ltd., 50 Rs. 6,66,230.

DPE: From Saudi Arabia: Assoc- Plastic Inds., 99 MTs., ,68,468; The Bharat Vijay Mills 80.5 MTs., Rs. 32,18,021; Leela ging P. Ltd., 48 MTs., Rs. 4,77,254; From Mexico: The Supreme Inds. Ltd., 15 MTs., Rs. 2,06,504; From Netherlands: Anand Polynotex, 38 MTs., Rs. 4,02,281; Ecoplast P. Ltd., 15,000 Kgs., Rs. 2,11,455.

MDPE: From Belgium: Telelink Nicco Ltd., 44 MTs., Rs. 2,31,950.

PVC RESIN: From France: The National Leather Cloth Mfg., 28 MTs., Rs. 51,265; From FRG: Lucky Plast Ltd., 38 MTs., Rs. 8,94,543; Royal Cushion Vinyl Products I. Ltd., 26 MTs., Rs. 5,99,787; From Korea: Cable Corpn. of India Ltd., 50 MTs., Rs. 7,17,828; Caprihans India Ltd., 100 MTs., Rs. 15,33,039; The Hukamchand Mills Ltd., NA, Rs. 1,27,562; From Mexico: AMC Coated Fabrics P. Ltd., 52 MTs., Rs. 9,49,159; Bhor Inds. Ltd., 59.8 MTs., Rs. 10,96,418; Lucky Plast Ltd., 52 MTs., Rs. 9,49,159; Premier Vinyl Flooring Ltd., 100 MTs., Rs. 11,95,535; Regider Plastics P. Ltd., 49.5 MTs., Rs. 5,90,779; Star Oxides & Chem Ltd., 204 MTs., Rs. 2,55,292; Streamflow Plastics P. Ltd., 100 MTs., Rs. 11,93,413; Super Polyplast P. Ltd., 199 MTs., Rs. 23,98,624; Tainwala Chemicals & Plastics, 33.3 MTs., Rs. 4,09,543; Union Inds. Ltd., 102 MTs., Rs. 12,18,016; Vinyl Products, 78 MTs., Rs. 13,45,824; Streamflow Plastics P. Ltd., 23.75 MTs., Rs. 3,12,802; From Taiwan: Aarti Leathers P. Ltd., 20 MTs., Rs. 3,76,438; From USA: Finolex Cables Ltd., 47.775 MTs., Rs. 5,71,019; From USA: Finolex Pipes Ltd., 200 MTs., Rs. 21,75,905; From USA: Movilex Polymers P. Ltd., 100 MTs., Rs. 10,57,882; Plastotex (Bombay) Pvt. Ltd., 50 MTs., Rs. 2,28,941; Plastotex Ext. & Moulds, 50 MTs., Rs. 5,28,941; Universal Cables Ltd., 108 MTs., Rs. 13,40,251; Universal Manu. Co., 100 MTs., Rs. 10,57,882.

POLYPROPYLENE: From Australia: Garware Wall Ropes Ltd., 16 MTs., Rs. 2,28,429; Universal Polychem, 82.5 MTs., Rs. 9,11,422; From Czechoslo-

vakia: Hardik Indl. Corpn., 90 MTs., Rs. 9,65,828; From France: Gujarat Propack & Co., 64,750 Kgs., Rs. 15,91,488; From Netherlands: Maharashtra Plastic Inds., 48.45 MTs., Rs. 5,95,542; From Spain: Naresh Traders, 16.5 MTs., Rs. 19,911; Periwal Plastics P. Ltd., 1,650 Kgs., Rs. 2,08,926; From USA: Fibre Plast Corpn., 153 MTs., Rs. 16,25,274; Grover Overseas P. Ltd., 30,000 Kgs., Rs. 3,82,434; Intl. Plastic Products, 33 MTs., Rs. 4,14,142; Kalpesh Plastic Inds., 51 MTs., Rs. 5,41,764; Khetan Packaging 33,300 Kgs., Rs. 4,21,510; Mehta Traders, 17.01 MTs., Rs. 1,80,691; P.K. Plastic Inds., 16.5 MTs. Rs. 2,07,071; Poonam Polyplast, 16.5 MTs., Rs. 2,07,971; Print Pack Packaging. 16.65 MTs., Rs. 2,09,938; Rajasthan Petrosynthetics, 45 MTs., Rs. 5,72,476; Ruparel Plastics, 49.95 MTs., Rs. 6,03,066; Shah Enterprises, NA, Rs. 5,41,755; Subhash Corpn., 17 MTs., Rs. 1,80,504; Vishal Plastic Inds., 122 MTs., Rs. 2,73,990; Darshit Enterprises, 46.5 MTs., Rs. 6,11,180; Mehta Traders, 16.3 MTs., Rs. 1,73,223; Naresh Traders, 46.5 MTs., Rs. 6,11,481; United Bros., 46.5 MTs., Rs. 6,03,247.

POLYSTYRENE: From Korea: Bihani Plastic Udyog, 17 MTs., Rs. 2,46,396; From Korea: Chhajed Plastics, NA, Rs. 1,43,532; Easen Peripherals P. Ltd., 34,000 Kgs., Rs. 5,06,865; Hemant Plastics, 51 MTs., Rs. 7,39,188; Unilite Inds., NA, Rs. 8,49,090; Xpro India, 119 MTs., Rs. 16,38,265; From Saudi Arabia: Vishal Plastic Inds., 180 MTs., Rs. 25,47,252.

MATERIALS IMPORTED BOMBAY
(From 11.1.90 to 15.1.90)

ACRYLIC ACID: From Japan: Bhadresh Chemical Inds., 16,000 Kgs., Rs. 4,29,028.

ADIPIC ACID: From FRG: Polyurethane Inds., 400 Kgs., Rs. 1,06,16

AEROSIL: From FRG: Goodl Nerolac Paints Limited, 2,500 K Rs. 39,722; Reliance Silicones In Limited, 2,500 Kgs., Rs. 3,48,896.

ALKYL BENZENE: From US Kirloskar Brothers Ltd., 13.5 N Rs. 33,917.

ALUMINIUM HYDROXIDE: Fr FRG: Universal Cables Ltd., 11.2 M Rs. 2,16,022.

ALUMINIUM OXIDE SYNTH TIC: From France: Grindwell Nor Ltd., 15,800 Kgs., Rs. 3,15,549.

AROMATIC CHEMICALS: Fr Switzerland: Hindustan Lever Ltd., Kgs., Rs. 2,13,192; From UK: Hin stan Lever Ltd., 1,000 K Rs. 4,83,940.

BISMETHYL SILYLUREA: Fr FRG: Max India Ltd., 20,000 K Rs. 38,29,626.

D-CAMPHOR SULFONIC AC From Taiwan: Wockhardt Limi 2,000 Kgs., Rs. 4,12,596.

CAPROLACTAM: From Belgi The National Rayon Corporation L ited, 2,400 Kgs., Rs. 72,20,425; F Netherlands: Nirlon Syn. Fibre Chem. Limited, 3,060 K Rs. 92,06,043.

CARBON BLACK: From F Organic Coating P. Ltd., 4,400 K Rs. 1,80,030; 1,680 Kgs., Rs. 51,

CERIUM CRUDE: From Aus Tata Engineering & Locomotives, Kgs., Rs. 1,15,730.

CIS-3-HEXANOL: From Fra Industrial Perfumes Ltd., 10 K Rs. 15,181.

CITRIC ACID: From Ch Mitraco (India) Ltd., 17,500 K Rs. 2,57,228.

CITRIC ACID MONOHYDR BP 80: From China: Jayant Oil M 17 MTs., Rs. 2,42,125.

4-CYANOPYRIDINE: From Ja

P. Ltd., 5,000 Kgs., Rs. 3,97,123.

YANURIC CHLORIDE: From : Jay Enterprises, 2,000 Kgs., 1,19,298.

3 DIAMINO 1,5 DIHYDROXY HRAQUINONE: From FRG: ur Chem Ltd., 1,075 Kgs., 0,87,926.

4 DICHLORO NITRO BENE: From FRG: Sudarshan Chem-Inds., 7,000 Kgs., Rs. 3,96,714.

CYANDIAMIDE: From GDR: race Chemical P. Ltd., 2,000 Kgs., ,05,252.

ETHYLENE DIAMINE: From len: Pure Drugs (India), 1,425 Kgs., ,88,551.

ETHYLENE GLYCOL: From i Arabia: Ganesh Benzoplast Ltd., 39 MTs., Rs. 18,23,121.

PICHLOROHYDRINE PURE: China: J. Kirit & Bros., 16,000 , Rs. 4,12,596.

PICHLOROHYDRINE 98% .: From Hong Kong: Shah Chhal Laxmichand, 13,220 Kgs., ,69,658; From Singapore: Shah ganlal Laxmichand, 4,086 Kgs., 3,351; From USA: Shah Chhaganxmichand, 4,086 Kgs., Rs. 83,351.

THOXYMETHYLENE MALO-ACID ESTER: From FRG: Shar- Pharmls. Ltd., 3,000 Kgs., ,40,468.

ETHYL HEXANOIC ACID: From : Shreeji Enterprises, 7,200 Kgs., 2,004.

THYL SILICATE: From FRG: bay Paints & Allied Products, Kgs., Rs. 80,937.

EPTACHLOR TECH.: From : Pesticides India, 32,120 Lbs., 7,11,790.

YDROFLUORIC ACID: From BHEL, 1,200 Ltrs., Rs. 65,592.

OPHTHALIC ACID: From USA: Inds., 8,165 Kgs., Rs. 28,219.

L-LYSINE MONO HCl: From Japan: A & Co., 1,000 Kgs., Rs. 99,711.

L-LYSINE MONO HCl USP: From Korea: Geno Pharmls. Ltd., NA, Rs. 1,03,049.

MAGNESIUM OXIDE LIGHT: From Japan: Swastic Rubber Products Ltd., NA, Rs. 30,085.

DL-MALIC ACID: From Japan: Pioma Industries, 17.5 MTs., Rs. 4,31,748.

METHANOL: From Saudi Arabia: STC, 1,000 MTs., Rs. 16,93,556.

METHYL ETHYL KETONE: From France: Tony Electronics Ltd., 81.6 MTs., Rs. 8,73,960.

PARA NITRO ANILINE: From FRG: Sudarshan Chemicals Ind. Ltd., 5,000 Kgs., Rs. 6,32,516; From Korea: Nanavati & Co., 9,280 Kgs., Rs. 6,30,171; Pridor Chemicals & Ext. P. Ltd., 6,721 Kgs., Rs. 4,56,331.

PARA NITRO CHLORO BENZENE: From FRG: Bayer India Limited, 3,600 Kgs., Rs. 11,92,711.

NOVALDIAMINE: From FRG: Sharvani Pharmls. Ltd., 1,980 Kgs., Rs. 7,91,504.

OCTOIC ACID: From FRG: Narchem Industries, 14,430 Kgs., Rs. 2,68,768.

PARA OCTYL PHENOL: From Korea: Dai Ichi Karkaria Ltd., 2 MTs., Rs. 46,417.

PARAFORMALDEHYDE: From Spain: Speciality Chemicals, 18,000 Kgs., Rs. 1,43,436.

D(-)ALPHA PHENYL GLYCINE CHLORIDE HCl: From Netherlands: Malviya Chem. & Pharma P. Ltd., 1,050 Kgs., Rs. 4,51,677; From Spain: Ranbaxy Labs. Ltd., 6,440 Kgs., Rs. 26,08,686.

D(-)ALPHA PHENYL GLYCINE HCl: From Spain: Lupin Labs. Ltd., 7,564 Kgs., Rs. 30,84,323.

by R. Raghavan and published by N.R. Rajagopalan on behalf of owners, Sevak Publications, 306, Shri Hanuman rial Estate, Wadala, Bombay-400 031. Madras Office : 27, Begum Sahib 3rd Street, 1st Floor, Mount Road, Madras 2. Phone : C/o 831808 and printed by N.R. Rajagopalan at Sevak Publications, 25, North Mada Street, Thiruvan- Madras 600 041. Phone : 419265. Registered with the Registrar of Newspapers for India vide No. R.N. 1972/57.


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8.22

55th YEAR OF PUBLICATION

Chemical Weekly

VOL. XXXV — MARCH 13, 1990 — NO. 27

Edited by R. Raghavan and published by N.R. Rajagopalan on behalf of owners, Sevak Publications, 306, Shri Hanuma Industrial Estate, Wadala, Bombay-400 031. Madras Office : 27, Begum Sahib 3rd Street, 1st Floor, Mount Road, Madra 600 002. Phone : C/o 831808 and printed by N.R. Rajagopalan at Sevak Publications, 25, North Mada Street, Thiruva miyur, Madras 600 041. Phone : 419265. Registered with the Registrar of Newspapers for India vide No. R.N. 1972/5

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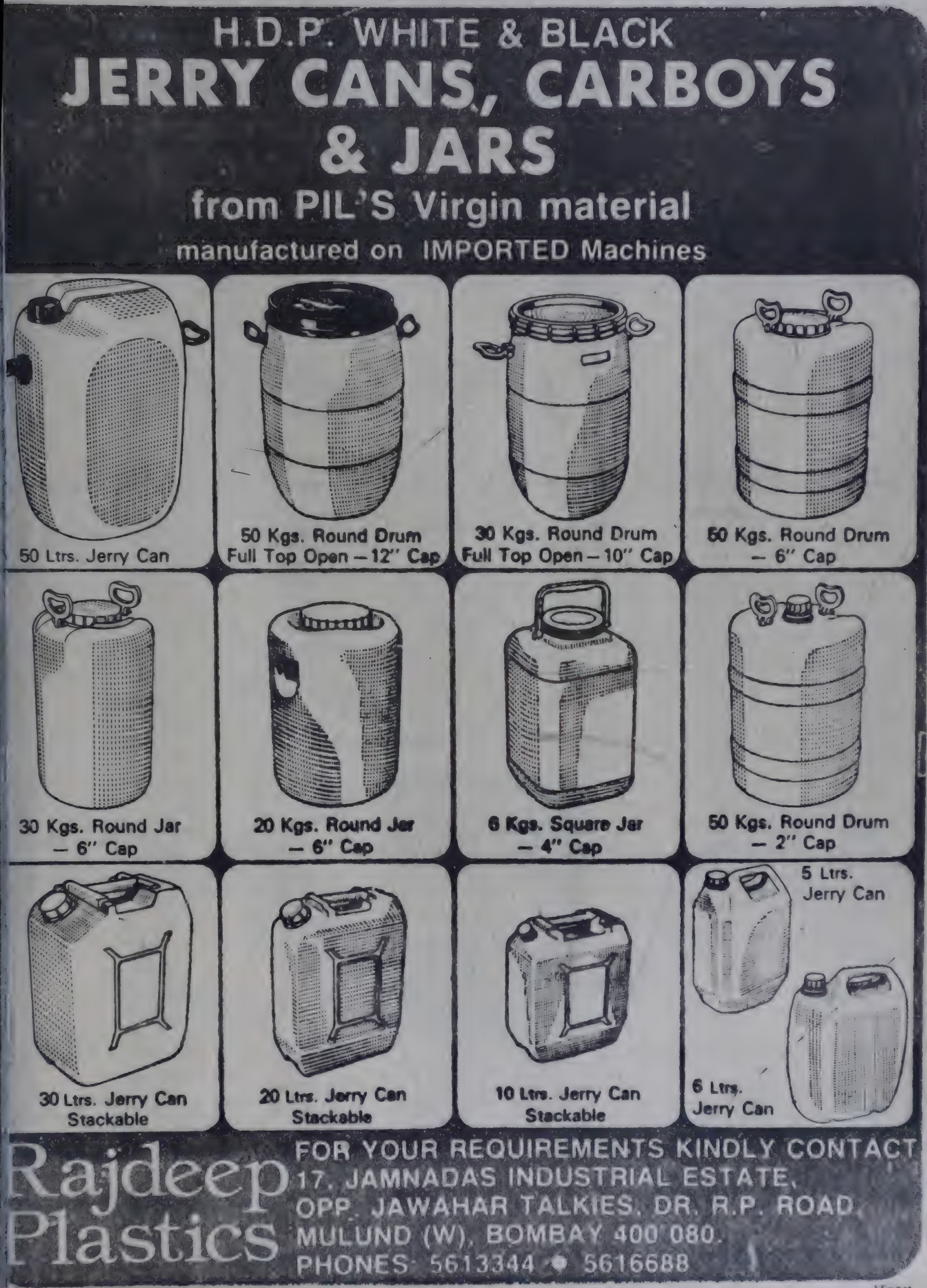
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Chemical Weekly

VOL. XXXV MARCH 13, 1990 NO. 27

Publishers:
SEVAK PUBLICATIONS

ditor - Publisher
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dvertisement Manager
R. RAJAGOPALAN

dministration/Circulation
JAY RAGHAVAN

ditorial & Administrative Office:
06, Shri Hanuman Industrial Estate
.D. Ambekar Road, Wadala,
OMBAY 400 031.
hones: 4120743/4131198.
elex: 011-76053 CWLY IN

ladras Office:
7, Begum Sahib III Street,
ount Road, Madras 600 002.
hone: 831808.
elex: 041-6290 CWLY IN.

rinted at:
evak Publications,
5, North Mada St., Thiruvanmiyur,
ladras 600 041.

ast Print Service,
07/308, Shri Hanuman Indl. Estate,
.D. Ambekar Road, Wadala,
ombay 400 031.

ubscription Rates:
nclusive of Postage)
dia: Rs. 400.00
oreign: US$ 175.00 (Air Mail)
US$ 75.00 (Sea Mail)

Subscription charges payable in
dvance in favour of
SEVAK PUBLICATIONS

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CHEMICAL WEEKLY

VOL. XXXV MARCH 13, 1990 NO. 27

HERALDING THE 21st CENTURY - 42

eyond the telephone — Revolutionary concepts ahead in communication technology

ehind the scenes, without much fanfare, researchers are experimenting with refining innovative communications concepts that ise to drastically change the way we live, work, and play. Tele e networks are gradually being transformed into vehicles that will le users to communicate in any combination of voice, text, and and to locate, use, and share information. Telephone service will istomerized for the individual user rather than for the location of elephone.

e rapidly expanding capacities of telephone networks are a big of the move toward the Information Age. The developed world dergoing revolutionary changes in the way information is stored, essed, transferred and used. These changes promise to give bus and individual users an array of new services that until very recently considered possible only in the fertile imagination of science on writers.

agine these future scenarios:

- ou will be able to send pictures to someone thousands of miles away, d the images will be as clear and realistic as the view through a ge picture window.
- our written messages, such as fascimilies, will be converted into ice and delivered to you over your car phone.
- ou may sit in a restaurant and be able to route a call from your ss directly to the tiny cordless phone in your pocket, while all your ers calls are forwarded to a message center.
- heart specialist in Manhattan will provide advice to surgeons operng in Los Angeles, where pictures transmitted by telephone will mit the specialist to see the operation as though he were in the erating room.
- movie buff will be able to sit at home in front of her television wse through a database of critics' reviews -- and moving video views -- of nearly every movie ever produced, and select the movie it suits her mood to view at her leisure.
- ing speech-generated text, a deaf person will be able to use a tel one to converse with other telephone users without the assistance a special operator.

merging technologies are rapidly changing the fundamentals of tele nunications, transforming telephone companies into comprehen communications deliveries that will integrate the functions of 's telephone, cable television, video conferencing, and data nunications networks.

Integrating Communications: Over the next couple of decades, the telecommunications industry is likely to find itself complementing, merging, or competing with office information systems, home-entertainment electronics, and high-speed data and image transmission services. The timing of these developments depends on economic, regulatory and technical factors, determining how rapidly advances in digital techniques and lightwave technology are installed in telephone networks.

Telephone networks are moving beyond their voice orientation. Since the 1960s, telephone operating companies have been integrating digital techniques into their transmission networks and other equipment. Computer systems and related software packages can be attached to telephone networks, giving them intelligence and wide-ranging uses and power.

Perhaps the most important step that must first occur for such a transformation is the installation of fiber-optic cable throughout local and interstate transmission networks, particularly to end users such as homes and business. Much of the internal transmission capacity of most telephone companies has already been converted to fiber, and a number of large businesses have access to fiber networks; however, it will be a number of years before all users are connected with fiber. The main reason is that the cost of replacing the vast existing copperwire plant has to be spread out over many years. For large-volume users -- in terms of voice, data, and video -- the economics make sense today.

New fiber-to-the-home installations would be viable if their cost-compound of trenching, terminal electronics and installation labour were comparable with the total cost of today's telephone line installation, or about $1,000-1,500 per home. Fibre to all subsribers is a virtual certainty in 25-30 years, and many subscribers are likely to have it in the 1990s.

A fiber network will have the capacity, in terms of both volume and speed, to deliver universal communications, consisting of:

* Communications among people anywhere, at any time, in any medium or combination of media (visual, voice, image, or data) and at acceptable cost.
* Retrieval and sharing of information from dispersed sources and in multiple media.
* Distribution on demand of a wide variety of cultural, entertainment, and educational materials to homes and businesses.

No one expects these goals to be realised soon, operating companies have come a long way toward reaching these goals in the normal course of building more-reliable and economical communication networks.

Existing copper cables, for example, can handle the current major thrust in telecommunications, the Integrated Services Digital Network (ISDN), which allows users to send voice, data and images over a single telephone line. In the United States, ISDN has moved out of the trial stage, and several telephone operating companies began delivery in 1988.

ISDN will make it relatively simple for a single call to handle simultaneous voice and document (fascimile, text and graphics) transmission, in which the connected parties could edit the document as they discussed it. ISDN will offer sufficient telephone network capacity for five-second-per-page facsimile, various forms of high-quality photographic transmission and "Super Videotex" information service in multiple media. With advances in digitial-coding technologies, it will support high-fidelity audio and limited forms of videotelephony over telephone lines. Private ISDN networks are also being planned and some may be quite extensive.

Fiber optics and intelligent networks will be the decisive factors in moving telephone networks beyond their voice orientation. This will come with the Broadband Integrated Services Digital Network, or BISDN. BISDN will be the means for offering simultaneous extended-quality, on-demand video services, interpersonal communications and high-speed data and image communication among fax machines, work stations and computers (including increasingly portable versions). BISDN, of course, will be able to provide basic telephone and telemetry services (e.g. home security alarms, utility monitoring, etc.).

BISDN is now moving out of the laboratory; research at Bellcore, for instance, has resulted in experimental models of broadband, digital networks with the promise of economic feasibility as technology follows a descending cost curve.

Developing the Prototypes: Bellcore is testing a number of prototypes to determine which potential services can meet market demand and be provided economicaly. Several involve applications of multimedia services that would help people locate, display, and share electronic information as easily as they now use their telephones. These experimental services include:

* *Video browsing.* Catalogue shopping, for example, enables viewers to select clothing from an electronic catalogue that displays a succession of pictures of the garments, gives a text description that includes prices and sizes, and provides a means of electronically ordering merchandise. Another application involves a real-estate search, where users could set various parameters (e.g. price, location and property taxes) and examine the properties that meet their criteria. Prospective home buyers could then view the rooms, the landscape and neighbourhood, while checking out local schools, churches and shopping districts.

* *Movie browsing.* When broad-band networks are in place, users of such a service would be able to peruse a large library of movies, conducting their search based on titles, directors, stars, subject matter, or whatever their preference. Text, pictures and moving video clips would also be available.

* *Information grazing.* Another potential service enables a user to obtain new information in multiple media, broadcast from a host of different sources. A personal information filter would drastically cut back the information overload, passing only those items (text, pictures, video, etc.) of interest to the user. This system could be followed up with high-speed electronic searching and browsing.

* *Smart Searcher.* This future electronic service would allow you workstation not only to locate what you know you want, but would also locate other related materials that might be helpful that you didn think to ask for directly.

Toward Personalized Telephone Service: Researchers are now experimenting with telephone systems that provide services associated with individuals rather than their telephones. One system provides user with the ability to send or receive messages by voice, text, video, o any combination of the three. The experimental service enables user to work with voice dialling, automatic call back, and selective call forwarding. Computer graphics allow users to easily reconfigure their personal service by using a computer mouse.

The addition of synthesized-voice technology will permit written messages to be translated into voice so users can gather their messages from any phone connected to the experimental network. In addition, user could make any phone on the network act like their own phone by punching in their phone number, or instruct the system to route incoming calls according to such variables as the identity of the caller or the time of day.

The goal of designing a telephone system where calls are directed to people rather than telephone is further supported by work with digitial portable radios. Users could carry a hand-held transmitter/receiver about the size of a cigarette pack. Two-way voice and data communications would be available anywhere through this compact, lightweight instrument capable of running for hours without recharging the battery. The system would work through a series of compact digital transmitters/receivers deployed as universally as traffic lights, fire hydrants, o mail boxes. And of course, the tiny telephones could be used with other systems.

Advancing telecommunications technology, indeed, offers exciting prospects, as well as potential solutions to difficult situations of human interaction. A Telecommunications Network for the Deaf (TND), for example, would enable deaf and nondeaf persons to communicate using the telephone network. The laboratory model uses a computer to convert speech into text and text into speech. A hearing-impaired person could type messages into an existing telecommunications device for the deaf, and the TND would translate the typed messages into synthesized voice. The voice messages on the other end would be converted by the computer into text for read-out on the device used by the hearing-impaired customer. The TND, developed by Bellcore improves upon existing systems by eleminating the need to have an operator serve as a relay for translating conversations between deaf and non-deaf persons. Providing relay operators can be costly and lacks confidentiality.

Many of the services described here have proven technically feasible and could well become a reality within the next decade. Many new services and improvements will be available in the shorter term. But as indicated earlier, the network must ultimately become broadband the tools for viewing, sharing and retrieving information must be perfected and installed; and numerous regulatory, legal and business decisions must be made before telephone networks can become all-purpose communications vehicles.

— **T.P.S. RAJAN**

(Condensed from an article by Stephen B. Weinstein and Paul W. Sh mate of Bells Communication Research (Bellcore) in the *Futurist* November-December 1989).

HEMARENA

VENKITESWARAN

Avoidable Controversy

Pepsi project in Punjab for manufacture of the famous nk concentrate and soft drinks along with other pro- as been the subject of severe criticism and opposition e very beginning. The Indian soft drinks industry may ad misgivings about the threats from a multination- osidiary aiming at a good share of the Indian market. o when Pepsi was once in India and selling the famous ink through an associate Indian company and shut he operations and quit over 2 decades back. Subse- tempts of the other cola giant Coca Cola was thwarted Janata Government as they had no intention of shed- ny light on their secret formulation or team up with parties in a joint venture. Subsequently the Indian soft industry has progressed by leaps and bounds to a Rs. ores one when the proposals for a Pepsi joint venture up. The Punjab Agro Industries Corporation and the r marketing experts of the country M/s. Voltas were he partners.

overcome the criticism of a foreign multinational ent- India's well established soft drinks industry the pro- e was expanded into a food processing one with sing of Indian fruits and vegetables into products for ernational market. There was to be a ready and pro- outlet for the large surpluses of fruits and potato of which may perish without such expanded markets. sociation of Punjab Agro Industries Corporation in the e added great weight to this argument and Pepsi was osition to bring better seeds and farming methods to quality improvements in selected fruits and potatoes both quality and yields will improve. Punjab farmers epend on wheat and rice as the main crops (and some had large surpluses over Punjab's needs which served . foodgrain needs of the rest of India. These argu- were indeed very weighty and made the Government nt their earlier stand and allow the Pepsi soft drink con- te and soft-drinks to be included as this was the con- of the multinational to come in. After over two years s and negotiations the project was approved on certain specific conditiions about 18 months back. The project estimated to cost Rs. 21.5 crores with 40% as equity shared by the 3 promoters (PAIC being the largest) was to produce:

- 7,000 tonnes of snack foods
- 12 t/hour of tomato and fruit pulps concentrates
- 35 million cases of soft drinks of which 75% will be exported earn five times the total annual foreign exchange outgo.

It was claimed that 50,000 jobs would be created and 25% of the specified fruits and vegetables will be bought and new demands created. But things have not gone as per schedule or promises. The project cost has more than doubled and capacities raised presumably to get better economies. More particularly the soft drink concentrate is to be raised by 80% so as to get more turnover in exports and profits. The venture is now ready with a grain and potato snack food for the home market and ready to launch its soft drinks but little else and no fruit-based product. Very recently it is reported that an export order has been secured for Rs. 7 crores worth of tomato paste, which in any case was one of the regular products of our food processing industry and its exports.

It is this situation that has changed with a change of Government and carping criticism once again from highest levels of authority. The revised picture and any drawbacks or failure to meet the set conditions could have been studied and such corrective measures introduced as may be founed necessary, more so as the public sector PAIC is a major partner in the project. There is no need to rake up the past on the entry of a multinational in our soft-drinks sector. Efforts should be on a reiteration of the set objectives of generating a lucrative market for fruit and vegetable based products in the international arena through the Pepsico partners with at least five fold export earnings over outgo. There could be delays in effecting higher levels of farm technology but that should not be an alibi for concentrating on the soft drinks area which was to be a minor part of the project.

Ligno cellulose-based materials

ile the conversion of lignocellulose material -- wood components cellulose and lignin has been receiving attention and more recently the use of lignin as a chemical base, there is also other lines of research to use the base material lignocellulose itself as a source of newer products of value. Pacifichem 89 had a long session on this subject

at its recent conference. (Ref. *C.E. News* of 15th January 1990.

Wood is a biopolymer of cellulose, hemicelluloses and lignin and has various functional groups such as hydroxyl, carbonyl, carboxyl, ether, acetal linkages. Lignin has also ethylene and sulphur containing groups. Etherification, esterification, alkylation, hydroxyalkylation, graft copolymerisation and oxidation have been carried out on the cellulose molecule leading to various products of value. The problem is to get such reactions on lignocellulose or wood itself to get improved products of engineering or structural value. Wood floor is used in the PF and other plastics as a filler and such wood polymer composites are in wide use. The aim of new research is on thermo-plasticisation of wood itself. But wood cannot be melted, softened or dissolved for moulding. If plastic properties are created in wood itself the area of usage expands just as nitration, acetylation, hydroxyethylation, etc. have improved the cellulose polymer. Derivatives with large substituents can provide internal plasticisation to confer such properties. Allylated wood is not fully thermoplastic but can be improved by blending with polymethyl methacrylate and dimethyl phthalate. Such modified wood can be improved through the external plasticisers. Wood board was made by phthalolyated wood and bisphenol diglycol ether.

Chemically modified wood can also be dissolved or liquefied. A recent finding is that untreated wood can also be dissolved or liquefied. Esterified wood dissolves in solvents like benzyl ether styrene oxide and phenol after treatm 200-270°C for 20 to 150 minutes or even milder cond Post-chlorination further enhances solubility. Wood treated with organic solvents at 200/250°C for 1 to 2 is dissolved by phenols, alcohols, glycols, ketones etc. to a paste like product with as much as 70% of wood co which is more reactive. Solutions of wood can be use adhesives, polyurethane foams and for making carbon f Dissolution of unmodified wood can open up a new fie utilisation. Carboxyl group-bearing esterified woods c obtained by treatment with acid anhydrides --a reaction does not need solvent. The fact that the wood polym be directly modified through crosslinking under heat i basis for particle boards. Wood components plasticise to reddish brown or yellowish brown smooth glossy plasti surfaces with for example phthalic anhydride. If ep adducted esterified woods are allowed to react with dride, alternate addition-esterifiation can be achieved allyl glycidyl ether or glycidyl methacrylate -- but the costly chemicals.

Acetylation of lignocellulosic fibres has been achieved liquid acetic anhydride or ketene gas. Cellulose fibre being subject to laser irradiation to see if improved or ified products can be obtained. The possibilities of anh oligo saccharides are being studied and these could be starting points for useful products. All in all there is hope for wider utilisation of the base lignocellulose thr the newer R & D in polysaccharide technology.

Hoffman la Roche takeover of Genentech

The takeovers in the drug industry in USA goes on and this time it is of a pioneer and prominent biotechnology firm Genentech by Hoffman la Roche, the Swiss company well established in U.S.A. The deal is reported to be worth \$492 million and the struggle for an independent place in the industry through biotechnology products for Genentech has ended largely because of the heavy investment required for production and sales. Roche plans to invest \$1600 million in Genentech in the next 2 or 3 years to push up some of their potential products at various stages of development and approvals. Genentech had revenues of \$400 million last year and has hopes of cashing in on its development of the soluble protein CD4 to fight the AIDS battle. Genentech new approaches for proteins by biotechnology and g engineering and have several promising items on line. nase is an enzyme (protein) which could be useful for ling pulmonary embolism, angina and even stroke. They also pioneered interferons through genetic means and for a share of the potential market. Tumoi neurosis is another potential agent for possible fight on cance

It is expected that Roche may get a jump in the gro market for biotech drugs which are invariably of a high category.

ICMA plea to reduce duty on capital goods imports

In a pre-budget memorandum submitted to the Finance Minister, the Indian Chemical Manufacturers Association has called for a major effort to reduce project costs in the chemical sector, particularly petrochemicals which is highly capital intensive. High import duty on capital goods at around 80% coupled with the high interest rate on project loans have made projects in this sector in India about 75% costlier than corresponding investments for US Gulf Coast installations. Apart from the high capital goods import duty, the various levies on inputs, feedstocks and raw materials range anywhere from 75% to 150% or above. The Association has impressed on the Government that products of the chemical industry go to meet essential needs of the common man and not for elitist consumption. These are, for example, drugs and pharmaceuticals, agro-chemicals, food preservative additives, plastic products, packaging materials, textiles etc. Therefore, there is need to reduce costs of end chemical products to more acceptable levels to serve an expanding market.

The Association has pleaded for reduction of import duty on capital goods to around 25% of CIF value and making available inputs and raw materials like naphtha, benzene etc. to downstream projects and value-adders at competitive international prices. The Association says that there is need to introduce a true VAT system as applicable in the European Common Market by means of which all duties payable on finished products are levied at the final stage. This will avoid the crushing burden on manufacturers in tied-up working capital and higher financing charges.

Other important suggestions made by this apex body of the chemical industry are (i) Waiver of customs duty on pollution control and safety equipments and appliances alongwith a scheme for soft loans for financing their purchase and installation & (ii) introduction of a scheme for duty free import of capital goods with commitment to export products three times the value of capital goods in specified time frame.

The Chemical Industry has emerged as a dyanamic sector in the exports of the country with exports having reached nearly Rs. 2,200 crores last year and slated to exceed Rs. 3,000 crores during the current year. The dyes and dyestuffs sector shows promise of increased exports, and ICMA memorandum makes out a case for excise duty rationalisation that will permit enlargement of size of operation in the dyes and dyestuffs sector with benefits of scale economies.

Deemed exports should receive favourable treatment under the Income-tax Act as well as being taken into account for determining Export House or Trading House status. Besides, the Association has impressed the need for making export financing less expensive to help exporters.

LAW SOON TO MAKE INSURANCE MANDATORY FOR COMPANIES DEALING IN HAZARDOUS WASTES

The Minister of State for Environment and Forests, Mrs. Maneka Gandhi, said at New Delhi on March 6 that the government is working on 'mandatory public liability insurance' legislation, under which each company dealing in hazardous wastes will be asked to introduce mandatory insurance scheme for the victims. The minister was speaking at a 'buyer-seller' seminar in the area of pollution control equipment organised by FICCI.

Speaking on the occasion, the minister informed the participants that the government will soon set up a national waste management council which w[illegible] assist the industries in productive ma[illegible]gement of their wastes. Mrs. Mane[illegible] Gandhi also reiterated the need to re[illegible]cle wastes. She also warned the indu[illegible]trialists to make use of substitutes [illegible] chlorofluorocarbons (CFC). Express[illegible] her concern about the fast deteriorati[illegible] environment, the minister urged the re[illegible]resentatives of industries to work [illegible] development of economically via[illegible] technology and indigenous instrum[illegible] for pollution control. The need to ins[illegible] proper pollution control equipment [illegible] their constant use was also stressed up[illegible] by the minister. In this context, [illegible] minister suggested that common eff[illegible]ent plants could be set up by group[illegible] industries. Mrs. Gandhi also told [illegible] delegates that the ministry was condu[illegible]ing an experiment in the state of H[illegible]yana, under which 320 industries [illegible] been asked to choose five villages [illegible] for intensive replantation. She appe[illegible] to various industries from other s[illegible] to follow suit. She also assured [illegible] industries that government would [illegible] help them to get more resources for [illegible]lution control and management [illegible]grammes.

PROFESSOR K. VENKATARAMAN LECTURES

Dr. A.V. Rama Rao, Indian Institute of Chemical Technology, Hyderabad will deliver two lectures under 'Professor K. Venkataraman Lectureship' in the old auditorium of the University Department of Chemical Technology, Matunga, Bombay 400019 on Monday the 19th March 1990 at 5.00 P.M. and Tuesday the 20th March, 1990 at 5.00.P.M. The topics of the lectures are as follows:

1. Asymmetric synthesis: Opportunities and Challenges
2. Studies directed towards the total synthesis of immunosuppressive agents: cyclosporin and FK-506.

Prof. M.M. Sharma will preside over the lecture and lectures are open to public.

Centre urged to modify sales tax on dyes

The Tamil Nadu Dyes and Chemicals Merchants Association in an appeal to the Finance Minister has called for a shifting of dyes and chemicals under the purview of section 14, of the Central Sales Tax Act thus ensuring availability at uniform rates all over the country.

The memorandum submitted to Shri Madhu Dandavate, Minister of Finance notes as below:

"While enacting the Central Sales Tax Act in the Parliament, the then law makers have been cautious enough to see that taxation policy on the goods of special importance in the inter State trade, are regulated and uniformity is maintained throughout India, so that the industries get the raw materials and important ingredients at a reasonable price without much fluctuation from one place to the other, and for this purpose separate Section 14 has been incorporated in the Act.

"The government of India have included in this section, items of goods which are of special importance to the steady and uniform growth of industries like coal, iron and steel, jute and articles of daily needs and raw materials to the general public like cereals, oilseeds and cotton. Thus the Government have been meticulous to see that undue taxation burden is not thrusted on goods which are essential for industrial growth in India.

"We submit that dyes and chemicals are very closely associated with every industry, whether large or small, in some proportion or other. No industry can run or survive without use of chemicals in some proportion. Hence it is submitted that dyes and chemicals are essentially to be included in the list of goods of special importance, in Section 14 of the CST Act. It is submitted that the rates of tax in respect of dyes and chemicals vary very widely from one State to another and also from one kind to the other in the same State.

"In Tamil Nadu, the rates of Sales Tax on dyes and chemicals range from 4 per cent to 10 per cent singlepoint and 5 per cent multipoint. In the States like Gujarat, Maharashtra, West Bengal, Delhi etc. it is far less particularly for home consumption.

"We submit that this state of affairs is not conducive for the uniform growth of the industry in all the States. Tamil Nadu State is very much backward in the industrial growth due to heavy and unsteady incidence in taxation policy.

"We submit that this position can be obviated only if the dyes and chemicals are included in Section 14 of the CST as goods of special importance so that the taxation policy is well regulated.

"We request the Hon'ble Finance Minister to kindly consider the above aspects sympathetically and order inclusion of dyes and chemicals in Section 14 of the Central Sales Tax Act."

DMAI HOLDS HALF-YEARLY MEET AT BANGKOK

The Dyestuffs Manufacturers' Association of India holds its half-yearly meeting away from its head quarters a Bombay, at some important dyestuff centre, to give a breather to its assembled members from their mundane routine and enable them to exchange free and frank views regarding status of industry's current position and its future prospects. A team of 48 delegates including ladies led by the President Mr. Anil Mehta, left on the 25th of January, 1990 for a six days programme of visiting Bangkok and Singapore. (See photograph below).

Mr. Sompong Chrenviriyankul Chairman of Geerewat Dyestuffs Co Ltd., a manufacturing company of dyestuffs had arranged a dinner in their honour with his family members involved in his business activities.

Mr. Pin, President of Association of Chemicals Traders, initially talked on the General Economic performance and according to him Thai economy can be described as "Heated Economy" with impressive growth in GNP. This according to him is only possible with favourable government policy to attract outside investments from Asian countries including India and Japan.

Mr. Pin also mentioned on India

DMAI meet at Bangkok. Seated from left to right: Mr. Ajay Kadakia - Vice President, D.M.A. Mr. Kapasi - President, Indo-Thai Chamber of Commerce, Mr. Bajaj - Chairman, Thai Am Group companies, Mr. Vinay Verma - His Excellency, Indian Ambassador to Thailand, Mr. Anil Mehta -President, D.M.A.I., Mr. Bhatt - President, Thai Ambica Co. Ltd.

ments in Thailand in the field of n black, textile and now in dyes- He said that dyestuffs industry in ind has a good future as country ong textile base and it exports 50 nt of its garment production to UK and other countries.

26th evening, the Republic Day dia, Mr. Peter Vaz, Director, gi Inds. Ltd., from Mafatlal group ngkok arranged a dinner at Hotel in Bangkok. Dinner ended with to the hosts with nice presenta- momentos on behalf of D.M.A.I. th, in the evening, the D.M.A.I. s half yearly meeting and it was st time that the association had early meeting outside India and it great success as the response from embers was much better than ex- . The half yearly meeting was fol- by a dinner at Hotel President was hosted by Thai-Ambica Mr. Shivnathraiji Bajaj, Chair- f the group companies specially to Thailand to welcome the del-

Girish Shah one of the executives company welcomed the gather- Ir. S.P. Bhatt, President of Thai a, during his brief speech traced g association with Indian dyes- ndustry. He also mentioned the developments in dyestuffs indus- Thailand.

dinner, many dignitaries includ- s excellency Mr. & Mrs. Vinay , Indian Ambassador to Thailand, ent of Indo-Thai Chamber of erce Shri Kapasi, were invited. It great honour for the members of legation to meet all dignitaries raced the occasion.

Anil Mehta thanked Mr. Bajaj, rma, Mr. Kapasi and others and sed that Indian dyestuffs and ermediates industry has made progress in exporting goods to nd in recent years and he hoped mote more exports of Indian to Thailand.

DMAI PRE-BUDGET MEMORANDUM: PLEA FOR REDUCTION IN EXCISE DUTY ON SYNTHETIC ORGANIC DYESTUFFS AND OPTICAL BRIGHTENING AGENTS

The Dyestuffs Manufacturers' Association of India, in their recent pre-budget memorandum, submitted to Minister for Finance, sought a duty reduction on S.O. Dyes from present 30% (basic) to 20% (basic). The association also made an appeal to bring the duty on O.B.A. on par with S.O. Dyes, which was left out in the previous budget. The association submitted a detailed summary, justifying their demand without losing any revenue to the exchequer. In their memorandum, they have also requested enhancement of duty exemption limit for SSI units from Rs. 15 lakhs to Rs. 30 lakhs and suggested an increase in the present qualifying limit for concessional rate of duty below the effective rate, to 1.5 crores. A delegation under the leadership of President of D.M.A.I. Mr. Anil Mehta, met Prof. Madhu Dandavate, Minister of Finance, on Sunday, 18th February, 1990 at Sahyadri Guest House in Bombay. The delegation represents both the sectors in industry (organised & SSI).

SCOPE FOR WIDER INDO-US PETROCHEM LINKS

The oil and gas discoveries in the South provide excellent potential for Indo-US collaborations in petrochemical and mini-refineries projects in the region, according to Mr. William Clark, Jr., US Ambassador in India. The lube additives project established last year as a joint venture between Madras Refineries Ltd. and the Chevron Chemical Corp. of the US is an example in this respect, he said at a luncheon meeting hosted by the Indo-American Chamber of Commerce at Madras reently.

Ban on methanol imports urged

Close on the heels of an appeal by the Chemical Industries Association, urging continuation of imports of methanol under OGL, leading manufacturer, Assam Petrochemicals Ltd. (APL) has suggested a ban on imports of methanol, considering the surplus production in the country.

The following is the text of the letter received by CHEMICAL WEEKLY.

Dear Sir,

We have been reading in your publication dated Janury 23rd and 13th February that the Chemical Industries Association has urged upon the Government of India to maintain imports of methanol under OGL for at least three years.

The statements given by the Chemical Industries Association that there is a shortage of methanol is not true. As a matter of fact there has been surplus production. Most of the plants had been carrying on with high stock for want of market because of the import under OGL. Indigenous price cannot compete with imported one due to the following:

1. Raw material cost is high
2. The plant capacities are low. The biggest sized plant in India is 200 TPD whereas the capacities are above 1000 TPD abroad
3. Frequent shutdown of plants due to non-availability of market caused by flooding of imported material.

The following statistics give the actual position:

Rama Petrochemicals	55,000 T
NFL	16,500 T
GMFC	20,000 T
RCF	37,500 T
APL-I	7,000 T
APL-II	33,000 T
Total	1,69,000 T
85% availability	1,43,600 T
Recovered Methanol	44,000 T
Total availability	1,87,600 T

Methanol Consumption	
(86-87)	1,52,000 T
Expected (89-90)	1,65,000 T
Estimated (94-95)	2,42,000 T
Availability in 94-95	
Present availability	1,87,600 T
GNFC	1,00,000 T (90-91)
Deepak Fertiliser	1,00,000 T (90-91)
Tripura Petro	1,00,000 T (93-94)
Total	4,87,600 T

The Chemical Industries Association have mentioned that the demand for methanol in the South is around 50,000 T. This is also not based on fact. Actual requirement in the South is around 22,000 T only.

In the Eastern Sector APL have two plants having total capacity of 40,000 TPA. APL is able to supply the full requirements, in the Eastern sector. However one party in Calcutta imports material and as such APL have to send their material to far off places like Madras and Delhi incurring heavy loss.

Thus it can be seen that at this stage there is no justification in importing methanol under OGL and also reducing the import duty. As a matter of fact, if the indigenous industry has to survive, immediate banning of import is essential. It is suggested that the contents of the letter be published so that facts are brought to light.

Thanking you,

Signed
K. Cherian,
Managing Director,
Assam Petrochemicals Ltd.

PARAXYLENE PRICE AT RS. 13,000 LIKELY

The fair selling price for paraxylene produced by IPCL and Reliance Industries Ltd., (RIL) is likely to be fixed at around Rs. 13,000 per tonne.

The Committee of Secretaries see to be veering to the view tha Rs. 13,000 local manufacturers will sufficient protection as the landed c of imported paraxylene at 80 per c import duty is placed at Rs. 13,800 tonne.

Reports are that BICP has wor out a revised cost of IPCL's expan to 41,000 tonnes per annum and recommended Rs. 13,000 per to BICP has refused to touch Relia Industries as the latter is not provid the necessary data.

The Petroleum and Chemicals Mi try, along with the Finance Ministr backing the Rs. 13,000 per tonne tation for RIL. In the process, the C report of the Finance Ministry sugg ing Rs. 18,000 per tonne has dumped as it looks inflated.

If the Committee of Secret finally decides on a paraxylene qu tion of around Rs. 13,000 per tonne DMT price will be around Rs. 22 per tonne based on a conversion r of 0.68 kg. per one kg. of DMT w that of PTA should be ar Rs. 23,000 per tonne.

Currently, DMT is priced at ar Rs. 29,000 per tonne while PTA's is Rs. 24,450 per tonne. Clearly reductions are in order. Linked t exercise for cutting paraxylene q tions is the one being carried out b government on working out indic prices for various synthetic fibre yarns. The Textiles Ministry for getary purposes, is detailing fair p for all synthetic fibres and yarns, li to raw material prices to get a cheaper cloth to the masses.

The indicative prices will be e ced through cuts in import dutie adjustment in excise duties. A cl picture will only emerge in the co days, after paraxylene row is reso

Kerala stays levies on alcohol

Mr. Justice Chettur Sankara of the Kerala High Court has issued a stay order against imposition by the Kerala State Government of any levies and sales on rectified spirit imported into the state, on a petition filed by an industrial consumer M/s. Synthite Industrial Chemicals, Kerala.

Chemical Industries Association welcomes decision

Welcoming the stay order, the Chemical Industries Association has noted that the Kerala Government is presently fighting on a stay order preventing the State Government from levying duties on methanol. This, the association notes, in a press release, will stifle the growth of methanol based industries in the state. The following is the text of the press release issued by the association:

"Chemical Industries Association is happy that Mr. Justice Chettur Sankara Nair of Kerala High Court had on 26th February last issued a Stay Order against imposition by Kerala State Government of any levies and Sales Tax on rectified spirit imported into the State, on a petition filed by an industrial consumer M/s. Synthite Industrial Chemicals, Kerala.

"Our Association has been continuously submitting to all State Governments especially in South to treat ethyl alcohol as valuable renewable agricultural raw material on which diverse organic chemical industries can be based. The alcohol route is certainly cheaper than the petrochemical route, for locations where this agriculture based raw material is available.

"It is a continuing tragedy that all State Governments vie with each other in extricating maximum revenue out of this raw material which incidentally forms the base for intoxicating liquors as well. Only recently on 25th October 1989, the Supreme Court on a long pending petition by Synthetics & Chemicals, U.P. unequivocally set aside the rights of State Governments to levy any fees on Industrial Spirits — except some administrative charges commensurate with actual expenses involved.

"Instead of accepting the Supreme Court's directive, various States are trying to reimpose the levies through backdoor methods, although they all know that such fiscal charges will be detrimental to the well being and growth of alcohol based chemical industries.

"In the wake of the Supreme Court's judgement, Maharashtra withdrew on 12th January 1990 its levy of Rs. 0.50 per bulk litre of rectified spirit but managed to levy a fee of Rs. 0.20 per litre as **Administrative Charges.** Our Association is not aware of the reaction by the chemical industries and organisations like AABIDA based in Maharashtra to the decisions of their State Government. Probably they are content with the fact that they are now saving Rs. 0.30 per litre.

"While U.P. and other State Governments are still examining the issue, Tamil Nadu withdrew, by G.O. dated 3.2.1990, all levies not only on rectified spirit that go to chemical industry, but also on spirits that go to make IMFL. But simultaneously the Export Duty on Alcohol, which was brought down by the efforts of the Association, to Rs. 0.05 per litre, was raised to Rs. 13.28 recently which will be quite uneconomical to an alcohol deficient State — Kerala which is depending on supplies from alcohol surplus states, like Tamil Nadu, to the extent of about 100 to 110 lakh litres per year. So far as Tamil Nadu is concerned, their action evidently results in a glut of alcohol in the storage tanks of the State's distilleries which is having a cascading effect on the utilisation of their capacities, their uplift of molasses and molasses storage section of sugar factories.

"We also note from press reports that Tamil Nadu, along with U.P., is contemplating to file a review appeal in Supreme Court against the October 1989 verdict, which, as a corollary, debars the issuance of licences for a distillery from the purview of State Government's jurisdiction, as Mr. M.S. Gurupadaswamy, Union Minister for Petroleum and Chemicals, pointed out at the meeting of Central Molasses Board held on 2.2.1990.

"It is quite surprising that even while Supreme Court declared levies on alcohol that goes to produce intoxicating liquors, ultra vires and States like Tamil Nadu and Andhra Pradesh withdrew levies on methanol (which comes under Indian Poisons Act 1919), Kerala and Karnataka continue the irritant controls on methanol. It may be recollected that Kerala High Court stayed the collection of levies on methanol as early as 1969. Unfortunately Kerala Government is fighting out an appeal in this regard in the Supreme Court and in the process is preventing potential methanol based industries that could have come up in the States which are clamouring for more industries. We hope that wiser counsel will prevail on Kerala and Karnataka Governments and the levies and controls on alcohol as well as methanol will be removed in the near future, thus paving the way for more industries based on these raw materials in Kerala and Karnataka".

WBIDC, RIL SIGN MoU ON PFY PLANT

A memorandum of understanding (MoU) on the Rs. 225-crore polyester filament yarn (PFY) project in West Bengal was signed by West Bengal Industrial Development Corporation (WBIDC) and the Reliance Industries Ltd. (RIL) on March 5, said Mr. Subir Dutta, managing director, WBIDC on March 6. The proposal for the joint sector PFY project at Borjora in Bankura district was lying idle for several years. Mr. S.K. Birla, the original co-partner, readily agreed to withdraw from the project when the state government suggested its desire to go ahead with the project with a new partner — the Ambanis.

AY IN FIXING PRICES

DMT delivery slows down

e lifting of DMT from producers ome to a virtual halt following in the announcement of fair sel- rice for this basic raw material for olyester industry.

CL has informed the customers to taking delivery of DMT and that uld charge the price that would be by the government. Bombay ng and BRPL, the only two other producers in the country are cted to follow suit, if the uncement of fair price for para- e and DMT is delayed further.

A is an alternative raw material for olyester industry and Reliance tries is the lone producer of that ial in the country. The company educed the price of PTA from 2,625 per tonne to Rs. 24,550 ly on the basis of fair selling price for the material fixed by the government. Following this the DMT consumers have stopped taking delivery expecting similar reduction in the price of DMT from the present level of Rs. 29,000 per tonne.

The Association of Synthetic Fibre Industry has urged the Union government to fix a fair price for DMT immediately so as to remove discrepancy in the prices of alternative raw materials. In a representation to the government, ASFI has stated that RIL itself is the bulk consumer of PTA and the reduction in its price does not help most of the polyester filament yarn manufacturers in the country. It has stressed that the fair price for DMT should have been announced simultaneously.

IPCL, BRPL and Bombay Dyeing are the only producers of DMT in the country. IPCL and BRPL have their own production of paraxylene as is the case with RIL, while Bombay Dyeing depends on imported paraxylene, the landed cost of which is around Rs. 14,500 per tonne. Under the circumstances, there should be no difficulty in fixing a fair price for DMT on an urgent basis, the Association has added.

CENTRE MAY REVIEW OIL-HOEC EXPLORATION TIE-UP

The Union government is believed to be having second thoughts on giving permission to Oil India Limited (OIL) to team up with the private sector firm, Hindustan Oil Exploration Company (HOEC), to undertake exploration activities on a cost-sharing basis. A proposal in this regard, mooted earlier by HOEC to undertake exploration work jointly with OIL in the Ganga valley, has not made much headway. The government, it is learnt, would like to review the entire gamut of issues involved in it.

21 more drugs brought under price control

The government has brought 21 drugs under price control by putting them in the Second Schedule of the Drug (Prices Control) Order (DPCO), 1987 with effect from February 27, 1990.

The 21 drugs are: chlorpromazine, thioridazine, trifuluperazine, amitryptyline, imipramine, trimipramine, triprolidine, polymixin B. sulphate, glipizide, pyrithydione, zinc bacitracin, mitomycin, tolnafatate, flucinolone acetonide, carbenicillin sodium, oxyfedrine HCl, hysoline N-butyl promide, triamlinolone, naproxen, pyrithioxine, and L-dopa.

The drugs were hitherto outside the purview of price control. The Second Schedule of the DPCO, 1987 allows 75 per cent mark up over marketing and post manufacturing expenses incurred by manufacturers.

Bringing these drugs under price control follows the review of the drug policy initiated by the new government.

The policy is being reviewed with the objective of ensuring abundant availability of drugs at reasonable prices, introduction of newer drugs in the country, and strengthening the base of local industry in production of intermediate and bulk drugs.

A standing committee under the secretary, department of chemicals and petrochemicals has been set up for the purpose. Three expert groups have also been constituted to assist the committee.

Inclusion causes confusion

There appears to be utter confusion in the drugs and pharmaceuticals industry over the recent government notification.

Informed industry circles justify the government action by stating that most of the drugs now brought under price control are mainly imported and the emphasis is to encourage indigenous products. Some of these drugs are useful in cough and cold and the producers in most cases enjoy a major share in the market of the branded products, they added.

While others feel that this is an arbitrary and unilateral step of the government without taking the industry into confidence. The government has not spelt out the criteria on the basis of which it has included these 21 drugs under price control.

They have requested the government for an extensive dialogue on the issue and to keep the notification in abeyance till that time. The industry is disturbed as this unilateral decision by the government has come particularly at a time when the ministry has invited the views of the drugs manufacturers for the review of the entire drugs policy. Surprisingly, even before the industry has made its submissions, the government has initiated further control on an additional 21 drugs.

Mr. N.I. Gandhi, president of Indian Drug Manufacturers' Association (IDMA) and Dr. S. Agarwala, president of the Organisation of Pharmaceutical Producers of India (OPPI) say that the standing committee and expert groups appointed by the government have not deliberated on the issues and criteria for inclusion and exclusion by the expert committees have been totally ignored.

The department of chemicals and petrochemicals has recently informed the industry leaders that the government is considering review of the 1986 drugs policy containing measures for rationalisation, quality control and growth of pharmaceuticals industry.

The department has sought their views on this subject keeping in view the goal of making drugs and pharmaceuticals available to the masses in abundant quantities and at reasonable prices.

CORRIGENDUM: ARVIND CHEMICALS

In the advertisement of M/s. Arvind Chemicals, published in the 27th February issue of Chemical Weekly (Page 72), the phone number of the factory was wrongly printed. The correct number is 6732666. The error is regretted.

– Advertisement Manager

MINISTERS' MEET ON DRUG LOAN-LICENSING

The Union Minister for Petroleum and Chemicals, Mr. M.S. Gurupadaswamy, and the Union Minister for Health and Family Welfare, Mr. Nilamani Routray, met on March 7th to review among other things the continuance of the widely prevalent loan-licensing in the drug industry.

The drug policy announced in December 1986 provided for the phasing out of loan licensing by the end of the Seventh Plan. A committee subsequently set up by the Government however, unanimously recommended a four-year extension to loan-licensing. Mr. Gurupadaswamy has, however, indicated his opposition to the system.

Critics of the system argue that loan licensing should be ended as big companies exploit small units. The small sector, however, concedes that unless it procures business from big companies it will be forced to idle a part of its capacity. Its fear is that the end of the system will make many small units sick forcing them to default in repaying loans to commercial banks.

As many companies use loan licensing for fulfilling export orders, exports too will be affected once the system is ended, it is feared.

ore drugs to come under price control

ne Ministry of Chemicals and oleum is working on a plan to bring her 65 bulk drugs and their formu-ns under price control. Mr. M.S. ipadaswamy, the Union Minister in ge, is credited with the view to g all drugs under price control gh he is likely to face stiff oppo-n in the Union Cabinet if such a cal move is taken.

dustry in the Bombay is aware of plan which could imply falling back he 1970 drug price order when all drugs and their formulations came er price curbs.

esently, 145 bulk drugs and their ulations are under Category 1 and th a maximum allowable post ma-cturing expenses (MAPE) put at 75 100 percent respectively. If the ernment goes ahead with the strat-to broaden the spread by including her 65 bulk drugs, the total number rise to 210 and the country produ-225 bulk drugs at present. Only e minor items will be left out.

he Indian Drug Manufacturers' ciation (IDMA) and the Organisa-of Pharmaceutical Producers of a (OPPI) have sent a joint memo-um protesting over the decision to de 21 bulk drugs and their formu-ns under Category 2 with immed-effect.

here does not seem to be any ratio-in selection of drugs — tranquilis-one anti-diabetic drug, a anti-cancer and expectorant and many other al medicines — have been included reports are Mr. M.S. Gurupadas-y was keen on putting the yoke on industry.

ut Ministry officials advised against move as it could be objected to by Election Commissioner. Now with State Assembly elections over, Mr. upadaswamy is keen on going full m ahead. In Drug Prices Control Order 1970, there were two categories — essential and others. The return on bulk drugs was fixed at 15 per cent pre-tax on capital employed with formulations falling in "essential list" earning a 75 per cent mark-up with the rest 150 per cent.

The turnover limit for exemption from price control was Rs. 50 lakhs and profit ceiling 10 per cent pre-tax on sales. The trade margins were 12 per cent for retailers of prescription drugs and 10 per cent for OTC products with wholesalers entitled to two per cent.

Industry is prepared for harking back to the 1970 order if it is implemented in full. But this does not seem to be the case with Government keen on getting prices cut without looking at the aspect of making drug production attractive. Reports are the mark-up of 100 per cent on 21 bulk drugs and their formultions included recently will be calculated on 1984 cost basis even as production costs have gone up in the intervening period.

K.H. KABBUR MEMORIAL SILVER JUBILEE LECTURESHIP ENDOWMENT LECTURES

Dr. N.R. Ayyangar, Head, Division of Organic Chemistry II, National Chemical Laboratory, Pune will deliver a lecture under "The Department of Chemical Technology K.H. Kabbur Memorial Silver Jubilee Lectureship Endowment" at the Old Auditorium, University Department of Chemical Technology, Matunga, Bombay 400 019 on Thursday the 22nd March 1990. The topic of the lecture will be "Logic-Serendipity and Organic Chemical Reactions".

Professor M.M. Sharma will preside over the lecture. The lecture is open to public.

Call to step up vaccine output

"We should produce a minimum of 100 million additional vaccine to say that India has no shortage", said Dr. V.R. Kalyanaraman, Chairman-cum-Managing Director, Bharat Immunolog-icals and Biologicals Corporation, and Director of Pasteur Institute of India, Coonoor.

Delivering the chief guest's address on the occasion of launching the tetanus produced by the Pasteur Institute, Coonoor, he said that the tetanus toxide vaccine is used in India for two purposes — national programme of immunisation and routine needs of different segments.

Under the national programme of immunisation, he said, tetanus vaccine is used for triple antigen, DPT, tetanus toxide vaccinations of children as also pregnant mothers. "India needs about 100 to 120 million doses annually for this purpose and it is the highest quantum demanded in any country," he said.

For the routine uses of treating the injured and for other ailments, hospitals, industrial establishments, and medical outfits demand 120 to 150 million doses of tentanus vaccine, he said. The country's production is insufficient to meet this voluminous demand and there is shortage to the extent of atleast 100 million doses, he said.

Dr. Kalyanaraman said that the Pasteur Institute of Coonoor produced only 12 million doses of tetanus vaccine and other public sector units complemented the balance.

He observed that the Union Government cannot invest more funds for producing vaccine and this explained the need to promote vaccine production in private sector. He complimented the promoters of Pasteur Institute, Coonoor, for venturing into this life saving entrepreneurship.

He laid accent on quality control in view of the life saving nature of the vaccine and potency employed, and said this could prevent a host of diseases. He exhorted the scientists of the institute to set up a research and development wing and aim at producing newer vaccines which the country needs.

He called upon banks and financial institutions to adequately fund such projects because these are needed to build a healthy India. Dr. Harashavardhan, Director of the Vaccine Institute, said that this is one of the seven vaccine producing units in the private sector in India. It is the first unit in private sector to produce vaccine in Tamil Nadu, Kerala and Karnataka.

TIE-UP WITH USSR FOR VACCINE PROJECT

The first oral polio vaccine project in the Third World will be commissioned at Bulandshar in Uttar Pradesh next year. The project, being set up in collaboration with the Soviet Union, will produce 100 million doses of the vaccine annually.

The Soviet Deputy Minister of Health, Mr. Aleksander Kondrusev who was in New Delhi recently said that the project would be able not only to meet the domestic demand for the vaccine but also make it possible to export it to several countries. He said research and development work on the vaccine was being carried out for almost a year now at Bulandshar under the guidance of the Department of Biotechnology of the Ministry of Science and Technology.

Mr. Kondrusev who is also the Soviet chief state sanitary executive officer was confident that the construction of important wings would be completed by the year-end and the Soviet Union would be able to install equipment in another nine months.

UB may acquire sick drug co.

3 group is planning to acquire armaceutical company in West This was stated by Mr. Vijay the chairman of the group, "With this acquisition, we will g to our involvement in West which is already substantial," llya observed. "The group as two breweries, two distiller- one pharmaceutical company int factory in the state."

allya, however, declined to dis- e name of the pharmaceutical y that the group proposed to . However, according to d sources, Mr. Mallya is pro- eing on Sermapur-based Opec ons, the formulation division of bhai group.

r, the division was part of d Pharmaceuticals Limited of e group. A few years ago, the is separated the formulation and the bulk penicillin manu- g division of Standard Pharma- s and brought the formulation under a new company, Opec ions. However, the profitable ncillin manufacturing division ed to be under the Standard ceuticals Limited. Sarabhais, ng to informed sources, do not ns to sell the penicillin business. er, the separation of divisions ly in papers. The two divisions in the same premises as both of ere part of the same Standard ceuticals. The workers are also ne.

he past few years, the Sarabhais een trying to sell out the loss- Opec Innovations. But the effort t make much headway as the n of surplus labour could not be d satisfactory. There are about orkers and the accumulated loss, imated, will be nothing less than crores. The UB Group already pharmaceutical factory, Carews aceuticals, located also at Serampore.

The pharmaceuticals business, worth about Rs. 325 crores annually, is the mainstay of UB Group's total annual turnover estimated at Rs. 1400 crores. It will continue to be so in next couple of years. However, from 1993 when the group's turnover is expected to rise to around Rs. 2,000 crores, the number one position, according to Mr. Mallya, is likely to be taken over by the petrochemicals business.

Giving the details of the group's venture into petrochemicals business, the chairman said UB Petroproducts, set up in Madras at an investment of Rs. 71 crores to produce propylene, glycols, propylene oxide and polyols, was likely to be commissioned in June. The public issue of UB Elastomers to be set up in Vizag at an estimated investment of Rs. 378 crores to produce butyl rubber, was likely to take place late this year or early next year. Much, however, would depend on the Controller of Capital Issues which was not much in favour of mega issues and therefore coming out with new set of guidelines.

The work on the Rs. 1800-crore UB Petrochemicals to be set up in Vizag, Mr. Mallya said, was already in progress. Currently the environmental impact studies were being made. He declined to comment on the financial details of the project. "The financial package being prepared has to be cleared by MRTPC first and I would not like to comment on it till the clearance is available", he said. Apart from naphtha cracker of the capacity of 320,000 tonnes of ethylene annually, several downstream projects for producing such intermediates as PVC, HDPE/LDPE and polypropylene would also form parts of the complex. Applications had been made for securing letters of intent for these downstream projects, he said.

ASE penicillin plant to step up capacity

Ambalal Sarabhai Enterprises Ltd. (ASE) has been granted an industrial licence for increasing the production capacity of the existing penicillin plant from 140 mmu to 1000 mmu per annum. A technology transfer agreement has been concluded with Squibb for obtaining the latest knowhow for the manufacture of penicillin on terms approved by the Government.

The project cost is estimated at Rs. 5,600 lakhs. ASE's annual turnover is estimated to increase by Rs. 6,500 lakhs and there would also be a saving in foreign exchange of Rs. 2,400 lakhs per annum. The company proposes to implement the project at the earliest.

Because of its importance to the health programme of the country, penicillin production is placed in the core sector and is considered a national priority. The manufacture of bulk penicillin along with other antibiotics was pioneered by Sarabhai based on the technology obtained from Squibb of the US, a world leader in the field. Production of bulk penicillin was started in 1961 and the present installed capacity is 140 mmu per annum.

The company has claimed that the pharmaceutical division of ASE holds a very strong position for its penicillin specialities with the highest domestic market share. The company's competitive advantage lies in the fact that it is already a major producer of penicillin in the the country and its existing plant and infrastructure would contribute to lower initial capital cost and expeditious implementation of its expansion.

The latest technology and knowhow to be provided by Squibb and the optimum size of the project are expected to cut the cost of production. Conversion to semisynthetic penicillin, modernisation and expansion of vitamin C and pharmaceutical formulations and en[...]y conservation measures would als[...] undertaken in a phased manner. [...] ASE project will have a distinct [...] over grassroot penicillin project pla[...] by Southern Petrochemical Indus[...] Corp. (SPIC) of Madras and a sin[...] project jointly being implemented [...] Singhanias of JK group jointly [...] Tamilnadu Industrial Developm[...] Corporation Ltd. (TIDCO).

Having failed to get technicaal c[...]laboration from world leaders, the [...] have tie-ups with little known com[...]nies, one Portuguese and the other C[...]choslovakian. Neither are known [...] have proven, efficient technologies [...] penicillin production.

RADIATION AFFECTS CHILDREN

A high number of disabled [...] abnormal children are born to moth[...] exposed to nuclear radiation in Quilo[...] Chavara Neendakara, Ponmana a[...] Alappat villages of Kerala, according [...] a study done by the Centre for Industr[...] Safety and Environmental concer[...] The preliminary study reveals that [...] prevalence of Down's syndrome —[...] kind of mental handicap caused by [...] extra chromosome-21 — is four-tim[...] higher in radiation-exposed areas th[...] in other villages. Other common dise[...]ses in the area are epilepsy, blindne[...] mental retardation, skeletal abnorma[...]ties and deafness, the study said.

According to the CISEC secretar[...] Mr. V.T. Padmanabhan, these finding[...] are in sharp contrast to the claims ma[...] by scientists of the Bhabha Atom[...] Research Centre. They proclaim th[...] inspite of higher radiation in the vi[...]lages, the people are healthy and thri[...]ing. He said the earlier experimen[...] were conducted on lower animals whic[...] could be very misleading. The CISE[...] carried out its survey in the entire 26 k[...] long coastal belt of Quilon, which ha[...] rich deposits of monazite containin[...] thorium and uranium.

BICP study on technical grade pesticides pricing

The Bureau of Industrial Costs and Prices (BICP) is looking into the costing of technical grade pesticides.

BICP's decision to undertake a study of technical grade pesticides follows complaints made by formulators that they are charged exhorbitant prices. According to the Pesticides Formulators Association of India, the price charged by both multinationals and large companies for technical grade pesticides is very high compared to production cost, especially when the raw materials are released to non-associated formulators.

All technical grade pesticides such as phorate, butachlor, isoproturon, methyl parathion, monocrotophos, phosphamidon and DDVP will come under the purview of the BICP study.

Formulators alleged that the technical grade pesticides manufacturers have inflated their prices at least by 60 to 70 per cent which, will be ultimately borne by the farmers.

The association has pointed out, that the total input cost in the case of monocrotophos tech. in 1987 was Rs. 88, whereas the selling price was Rs. 215 per kg. In 1990-91, the total input cost is placed approximately at Rs. 73, whereas the selling price is Rs. 242 per kg.

Last year the Government reduced customs duty from 145 to 60 per cent and logically there should have been a reduction in the cost of monocrotophos technical. Instead the costs have gone up and the benefit of a reduction in customs duty was pocketed by the basic grade technical manufacturers, whose obligation it was to pass on this to the farmer.

The Pesticides Formulators Association of India, representing some 210 manufactures in the country points out that even though pesticides are classified by the Government as an essential commodity there is no price control or any rules and regulations for basic technical grade manufacturers. Both the multinationals and large scale Indian companies are exploiting the situation to the detriment of the farmers, the association charged. BICP has now called for a detailed statement and duty structure of select pesticides with a view to reviewing the prices.

POLLUTION: SC DIRECTIVE TO AGRO-CHEM UNITS

The Supreme Court directed on March 6, five agro-chemical industries in Bichhri, near Udaipur, to deposit within two weeks Rs. 1 lakh with the Rajasthan State Pollution Control Board to enable it to take steps to remove 3,500 tonnes of sludge from the area.

The court also directed the Board to notify the number of polluted wells and dewater them to make the water potable. The directions were issued by a division bench comprising Mr. Justice M.N. Venkatachaliah and Mr. Justice K.J. Reddy during the hearing of a public interest petition by the Indian Council for Environ Level Action.

The petitioner alleged that the discharge of highly toxic chemical effluents from the Hindustan Agro-Chemicals and four other industries had severely polluted the underground water in the area.The petition alleged that a large number of people were suffering from different diseases after drinking water from the wells in the area. About 80 wells had already been badly polluted, affecting more than 20,000 people. About 200 heads of cattle had already died and hundres of fruit-bearing trees had perished, besideslarge-scale damage to the standings crops.

COLOURING FERTILISERS

Govt. studying feasibility

The Union government is examining the feasibility of colouring mixed fertilisers to give them specific identity. It has asked the Fertilisr Association of India (FAI) to look at the proposal and submit its views. Use of restricted and specific colours for identifying mixed fertilisers like di-ammonium phosphate (DAP) and NPK nutrients has been mooted to ensure that there is no adulteration and blackmarketing. At present, distinction between DAP and NPK is not easy, once the nutrients are taken out of the bags. But specific colouring, to be accepted by all the manufacturers would make each nutrient recognisable by the colour.

The agriculture ministry has not yet estimated the cost that such colouring would entail for the industry. It is of the view that the additional cost for colouring should be borne by the industry. The ministry cannot take upon itself the cost burden as this would increase the government's subsidy to the fertiliser industry. The government at present is in no mood to raise the subsidy element either, as it has already crossed Rs. 3,700 crores in the current year, compared to Rs. 3,270 cr.in 88-89. The matter has been referred to the Fertiliser Association of India as the ministry fears that the industry might resist any additional cost on account of the colouring proposal. The association is now working out the cost details.

According to official sources, the technical feasibility and identification of the proper colours also have to be established before the proposal could be implemented. A substantial amount of research and development work would also be required. Total fertiliser production in the country is estimated at nine million tonnes during 1988-89. April-December 1989-90, fertiliser duction reached around six mil tonnes. Thus, colouring of fertili would indeed imply establishment o elaborate colouring system in eac the fertiliser plants.

The proposal for colouring mixed tilisers has been hanging fire for q some time. The issue has been raise the farmers time and again. But no f decision could be taken because of industry's reluctance on account o technological and cost implication

The move was given an added in tus soon after the deputy prime mi ter, Mr. Devi Lal, took additional ch as the agriculture minister. The fac he being a farmers' leader was a nificant factor in expediting exam tion of this proposal. This is bec colouring of fertilisers would ben farmers the most and reduce scope adulteration and blackmarketing.

SSI INVESTMENT LIMIT TO BE HIKED

The Planning Commission De Chairman, Mr. Ramakrishna He said the Government will s announce an upward revision of investment limits for small scale ancillary units. Mr. Hegde told a w shop organised by the All India M ufacturer's Organisation (AIMO) th will soon be holding discussions the Industry and Finance Ministrie this regard and about other probl being faced by the small units.

Mr. Hegde was replying to sug tions made by AIMO members investment in plant and mahinery fo small scale industries (SSI) shoul raised from Rs. 35 lakhs to Rs lakhs. This was in view of the pre inflation rate and erosion of the r value. They had also demanded tha exemption limit for exercise for s scale units should be raised to Rs lakhs.

Relief for plastic-woven sack units sought

The plastic-woven sack industry, while welcoming the government's customs duty reduction on imported polymers, has expressed concern over the government's proposal to import jute bags to meet the short-fall from domestic sources, according to a release. The president of the Plastic Woven Sacks Manufacturers Association (PLASMA), Mr. Rohit Bajaj, said customs duty reduction will not provide any significant relief to the ailing plastic woven sack industry. Earlier, when polypropylene raw material prices in the international market had gone up from $ 720 to $ 860 pmt, customs duties were also increased effective from January 5, by almost Rs. 9,000 per mt. The combined effect of this was to push it to Rs. 14,000 per mt. The recent reduction in basic duty from Rs. 7,000 to Rs. 5,000 per mt. reduces the duty burden by about Rs. 26,000 only which was insignificant compared with the earlier increase.

The plastic sacks industry due to idle capacity of one hand and heavy burden of excise on the other is struggling for survival. High production cost due to idle capacity and low realisation due to distress selling has forced all the units to incur heavy financial losses.

The industry is also burdened with heavy excise at all steps of its production process. When the industry is unable to recover fixed and variable costs due to distress selling, it ends up paying excise from its own pocket without earning the same.

Today, more than 250 of the total 500 units have already closed. Equity and net worth of most entrepreneurs have been cast. They are facing more than Rs. 350-crore debts to financial institutions.

Mr. Bajaj has pointed out that government notification no. 630 (E) dated 30.6.88 which compels the packing of 100 per cent of foodgrains, 100 per cent of sugar, 100 per cent of urea and 70 per cent of cement compulsorily in jute sacks is still continuing.

This only leaves the markets of non-urea fertilisers and 30 per cent of cement for the plastic sack industry.

Even if all urea and cement is packed in plastic sacks, which is not likely, it can consume 35,000 mt. of plastic sacks at the most against the industry's installed capacity of 1,60,000 tonnes. In other words, the industry is forced to keep 75 per cent of installed capacity idle. With 1,60,000 mt. of capacity chasing a market of 35,000 mt. all units are forced into distress selling.

Historically prone to nature's vagaries, the jute crop failed in 1974 and 1979 and jute shortages were compounded by labour strikes in the same year. Realising the danger of its over dependence on jute for its packaging, fertiliser was the first Indian industry to opt for the more reliable, non-agrarian, product-wise superior plastic woven sack. History was to repeat itself. This time in 1984, the jute crop failed once more, followed by labour unrest. With this, the cement industry became the second major user of plastic woven sacks for its packaging.

Mr. Bajaj feels that it is an absolute myth that if plastic sacks are allowed to be used for the packing of cement and fertiliser, it will destroy the entire jute industry. In fact, jute does not depend upon marketing of cement and fertilisers whereas the plastic sack industry depended entirely upon their markets for its survival. Tarpanlin grade jute hessian used for the manufacture of urea jute sacks is an exportable item and consumes higher grade raw jute which is in short supply. It is, therefore, in the interest of the jute economy also to divert urea packaging to plastic sacks. The plastic sacks industry which started in 1969 is owned by self-employed technocrats. 82 per cent of the units are in the small-scale sector. The technology employed in the industry is in modern and second to none.

Until 1984, the industry was reserved exclusively for the small-scale sector. Recognising the need of plastic sacks in lieu of growing packing requirement in the country, the government liberalised the policy and permitted large-scale investment. Mr. Bajaj has, in order to maintain a balance in supply of packaging materials, requested that the Jute Packaging Materials (Compulsory Use in Packaging Commodities) Act, 1987, be modified. He says it is also necessary that the plastic woven sack industry is relieved of the heavy excise burden and a suitable financial aid package put together for the industry.

WESTERN COALFIELDS ACHIEVE WORLD RECORD DRIVAGE WITH INDO-BRITISH ROADHEADER

The Pathakhera PK 1 Colliery in Madhya Pradesh recently set a world record tunnelling rate for low-height mechanised development of coal seams. The MAMC/DOSCO LH-100 Roadheader, which is manufactured under a joint collaboration between the British firm Dosco Overseas Engineering Ltd., and the Mining and Allied Machinery Corporation of Durgapur, advanced 45 meters in three shifts on 18 January this year in Bogdona Coal Seam. These results were achieved by a five-man development team in a section of level drivage 1.7m (high) by 4.8m (wide) representing some 630 tonnes of coal output. Pathakhera coal is well known as the hardest coal in India, and this success, part of Western Coalfields' drive for increased productivity, shows the great potential for achievement in India's coal industry using mechanised methods of underground coal mining and extraction.

Duty cut on plastics hailed

The plastic processors have welcomed the government decision to bring down customs duty on various polymers, their basic raw material. The cut in import duty comes on the e 'e of Plastindia '90, an international plastics exhibition and conference held in New Delhi.

Earlier, in a surprise move the government through a notification dated January 5, 1990, had substantially hiked the import duty on polystyrene, polypropylene, high density polyethylene, low density polyethylene and polyvinyl chloride.

The hike in duty was effected following the representations from the polymer producers in the country during last year when the prices of polymers in the international market had come down.

The delayed decision of the government had evoked protest from the plastic processors, who had argued that the duty hike came when the prices in the international market had recovered some of the lost ground.

The All-India Federation of Plastic Industries has hailed the reduction in customs duty on key plastic raw materials announced by the Government. In a news release issued at New Delhi, the Federation President said the hike in duty had made the landed costs of imported polymers prohibitive and the Government's decision to reduce the duty was welcome.

This, the release said, would revive the plastic industry which had slowed down after the duty hike. The release, however, said no cut had been announced for PVC which was an essential polymer with special use in agriculture, footwear, building and packaging industries. The duty had been reduced only in case of LDPE, HDPE, PP and PS. The high duty rate on PVC would hit both the processing industries and consumers, the release claimed. Nearly 1.5 lakh tonnes of PVC resin had to be imported every year to bridge the shortfall in indigenous production and the high landed costs of PVC would affect plastic industry's progress adversely, the release claimed.

RPL TO BEGIN IMPORT OF PLASTICS IN JULY

Reliance Petrochemicals Ltd., (RPL) will begin import of plastic raw materials from its collaborators for market seeding in July. According to company officials manning the RPL stall at the Plastindia International exhibition, at New Delhi, the glycol project will be the first to go on stream, hopefully in December.

The HDPE plant of one lakh tonne capacity will come up in the first quarter of 1991, in collaboration, with Du Pont of Canada. The PVC-project, also of one lakh tonne capacity, is to go on stream in the fourth quarter of 1990, with BF Goodrich technology. The EO/EG plant of 60,000 tonne capacity is to go on stream in the last quarter of this year with technology from Shell and Lummus Crest of the Netherlands.

The ethylene handling terminal at Hazira is at an advanced stage of completion, according to a video presentation on the RPL project. It shows men busy with the erection of tall structures at the site and claims that things are moving fast at the hitherto barren site. Company personnel reply in the affirmative when asked whether RPL has tied up ethylene supplies, but are unwilling to disclose the source. Larsen and Toubro is distributing questionnaires to visitors to assess the market for processing equipment.

The cynosure of all eyes at the Reliance stall is a 'kutia' (hut) representing the rural countryside, entirely furnished and equipped with plastic goods. IPCL also displays a similar but less impressive hut with walls coated with a PVC solution.

GE PLASTICS, IPCL SET UP JOINT VENTURE

GE Plastics Europe, a world leader in engineering polymers, and Indian Petrochemicals Corporation have promoted a joint venture — GE Plastics India Limited — which will undertake manufacture of engineering plastics in the near future.

Initially, however, the new venture will concentrate on the marketing and product development of engineering plastics in India as well as in West Asia and in neighbouring countries. Products to be handled by GEPI will include Lexan polycarbonate resin, Noryl modified polyphenylene oxide (PPO) resin and various alloys and blends which are GE Plastics proprietory lines of engineering polymers.

The market for engineering polymers in India is rising over the last two years in view of their wide ranging applications.

The collaboration will enable India to meet the requirements indigenously. The new venture will first build a new dedicated application development centre which will be located in New Delhi.

IPCL and the Holland-subsidiary of General Electric Company of the U.S. had signed a memorandum of understanding in December 1987. This gave IPCL the agency to market Lexan and Noryl in India. Both parties also undertook to evaluate the possibility of setting up a joint venture if the growth of sales volume justified the same. Sales of these two engineering plastics after IPCL took up the agency has been remarkable. Annual consumption of polycarbonate was around 100 tonnes in 1987 and PPO almost nil. Within a year sales touched 500 tonnes and in 1989 IPCL sold 1200 tonnes of both plastics

Further cut in polymer prices likely

Fiscal changes aimed at further reduction in polymer prices are likely to be announced in the forthcoming Budget. This will be in addition to the revised import duties on four polymers notified recently. The new duties will bring the landed price of polymers almost on par with the prices of indigenous material.

As a fresh revision of import duties is ruled out, the only way the Government can induce a downward price revision is to scale down the administered price of naphtha and other inputs. Naphtha is priced at Rs. 3200 for petrochemical industry, about Rs. 1000 more than what the fertiliser industry has to pay.

Officials agree with plastic processors' view that polymer demand has for long been suppressed because of high prices. If the prices can be brought down to an average Rs. 27 a kg, the demand will immediately spurt from the current annual consumption of 7.5 lakh tonnes to 10 lakh tonnes, they feel. Plastic processors who were in New Delhi to attend the Plastindia international fair were overjoyed when they learnt about the Government decision on arrival. Many could not believe that duty on polystyrene has been brought down from Rs. 17,500 a tonne to Rs. 1,000. They thought one zero had been omitted by error. Xerox copies of the notification were soon in circulation to confirm that what was being talked about was indeed true. Producers have no reason to complain as the landed price of the four polymers are slightly above theirs. Even polystyrene, at $ 1250 a tonne, works out close to Polychem's price of Rs. 37.60 a kg. Mobil's stall at Plastindia fair was quoting Rs. 885 for Saudi origin HDPE, which works out to about Rs. 33 compared to Rs. 31 charged by Polyolefins India Ltd. LDPE of Yugoslav origin was quoted at $ 850. Polypropylene at $ 850 works out to a landed price of Rs. 34,Rs. 2 more than Indian Petrochemical Corporation Ltd. (IPCL)'s price.

An estimated 30,000 tonnes of materials which had piled up in bonded warehouses all over the country will now flood the market. Importers had refused to clear them earlier because of the sharp increase in import duty. They will also resume opening letters of credit for imports which had stopped after the duty hike in January.

Polystyrene demand will now pick up, and importers will be able to source their materials from many countries, because the duty difference between preferred and non-preferred sources has now come down to Rs. 500. There is intense speculation that polystyrene and some other polymers are likely to be removed from the OGL list in the Budget.

Processors are also looking forward to IPCL to reduce prices of LDPE and PP which the company had promptly raised after the January duty hike. Another company to take advantage of the duty hike is Polychem which curtailed quota supplies to 50 per cent and began charging premium.

SHARP RISE IN PLASTICS EXPORT LIKELY

Mr. M.S. Gurupadaswamy, Union minister of petroleum and chemicals, said that the plastics industry expected to increase its exports to Rs. 170 crores during the current year (1989-90) from Rs. 129 crores in the previous year (1988-89). The minister, who inaugurated the "Plastindia 90", an internationl plastics exhibition at Pragati Maidan, also said that the government had come forward with several incentives which would help the plastics industry to increase further the exports and earn valuable foreign exchange in the years ahead.

More Petrochemical units planned

The government had also planned to set up a few petrochemical complexes to meet the growing demand of plastics raw material and reduce its imports, he added.

Speaking about the employment potential of the plastics industry, the minister said that more than 12,500 plastic processors located all over the country provided direct employment to over one lakh people and indirect employment to nearly 10 lakh people and represent an investment of Rs. 2000 crores. Mr. M.S. Gurupadaswamy said the government was treating the petrochemical industry as a thrust area in view of the greater future for the use of plastics.

The Minister said though petrochemical complexes are capital intensive, the plastic processing industry does not require much capital and is ideally suited for industralisation of backward areas. In his address, Mr. Arvind Mafatlal, Chairman, National Advisory Board, urged the Government to create an atmosphere of free competition by generating moderate overcapacity as plastics have a supply-driven market. He said till this is done, there should be no physical controls on imports and plastics should be kept under the open general licence.

The import duty should be such that plastics raw materials are available at economic and affordable prices.

FIBRE UNITS' PLEA ON CAPROLACTAM PRICE

The nylon industry has urged the Government to immediately fix the selling price of caprolactam on the lines of the recent step taken in the case of PTA. The Association of Synthetic Fibre Industry (ASFI) in representations made to the Department of Chemicals and Petrochemicals, the Ministry of Textiles and Finance has urged to refer to the BICP/CAB on an urgent basis the issue of fixation of fair selling price of caprolactam.

Incentives offered for plasticulture

The Government plans to offer special incentives to farmers to encourage use of plastics in different agricultural operations.

Inaugurating the 11 international congress on the use of plastics in agriculture at New Delhi on February 26, the Union Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy, said he expected increase in the subsidies to farmers for drip and sprinkler irrigation systems using plastics in the Eighth Plan.

The Minister said plasticulture in the context of development policy and planning could be used to promote agricultural development. He said there is a proposal to intensify the use of pla;sticulture in 15 selected districts and use them as a model for the neighbouring districts to adopt. These districts would serve as a demonstrative nucleus for further extensive propagation of plasticulture in the country, the Minister said.

He said the petrochemical industry had been assigned a key role in popularising plasticulture technology for various agricultural applications. The Minister said in its overall perspective, plastics has a role in fisheries, in rural water supply schemes, substitution of wood in packaging for forest conservation, storage of foodgrains at farmers level, packaging of fresh flowers, fruits and vegetables and many other farm level operations.

Plasticulture techniques represent an improvement knowhow and better utilisation of available resources, all of which combine to increase the productivity of the rural sector and hence the national welfare, he said. He said India has great diversity in agro-climatic conditions and plasticulture techniques could be applied in most of the zones.

The Union Petrochemicals Secretary, Mr. M.S. Gill, in his keynote address said that though plastics may not have a direct role in increasing the farm yield, yet its use in different areas of farming helped in raising the output and the productivity.

He said the experience gained from the world over pointed to the potential of plastics as an indirect output that can stretch the land resources, water resources as well as the nutrients to a high level of productivity as also the improvement in quality.

PLASTIC INDUSTRY HAILS DUTY REDUCTION

Shri Vijay Merchant, President, The All India Plastics Manufacturers' Association, Bombay has issued the following statement to the press. The Plastic industry compliments the new nationa Government for being responsive and remedying the crisis created due to steep duty hike on Polymers in January 1990. Both the Ministry of Petroleum and Chemicals and Finance Ministry need to be complimented for responding to the genuine demand of AIPMA by issuing a relief Notification No.15/90 dated 12.2.90 reducing the basic Customs Duty Rates as under.

Polypropylene from Rs. 7,000/- to Rs. 5,000/- PMT.
HDPE from Rs. 6,400/- to Rs. 3,000/- PMT.
LDPE from Rs. 6,200 to Rs. 3,000/-PMT.
Polystyrene from Rs. 17,500/- to Rs. 1,000/-PMT.

The 20,000 small scale plastics units will restart full production again. This would now give some courage to the importers to restart imports of badly needed polymers which have almost come to a grinding halt due to imposition of unbearable duty burden in January 1990.

The plastic industry is hopeful that this new Government will endeavour to lower polymers costs to realistic levels in the forthcoming Budget so that all Polymers become afforadable including PVC which is used in farms and houses.

Workshop discusses safety in industry

"While accepting the importance of Chemical Industry, we cannot ignore the hazards created by this industry and the remedy, therefore, lies not on abolition of chemical industry but on how to prevent and control the hazards" observed Mr. K.S. Baroi, Secretary (labour), Government of Maharashtra inaugurating a workshop on "Compliance with the Provisions of the Factories Act & other related statutes —problems and solutions" sponsored by the Bombay Chamber, Indian Chemical Manufacturers' Association and Thane-Belapur Industries Association on January 25.

Mr. Baroi said that modern life required a number of chemical products such as life-saving drugs and consumer items of daily use. In view of this fact, it would not be possible to prevent the growth of this industry but the growth of hazardous industry should be regulated to save human life and environment. In that connection he cited the example of Japan, Sweden, Germany and Indonesia where even large plants dealing with highly hazardous chemicals did not compromise on safety and environment. He said it was imperative for industry to think in terms of safety at the design and installation stage.

Emphasizing the need for trained man-power, Mr. Baroi said that the latest technology or comprehensive laws would not be able to prevent or control accidents, if industry did not have adequate trained man-power. He was happy to note that there was a change in the perception of industry regarding training. Many private undertakings and associations had come forward to create infrastructural facilities for the development of trained man-power. He particularly refered to the initiative taken by some associations to set up an institution to monitor environment, health and training obligations in Thane-Belapur area.

Earlier welcoming the chief guest, Dr. N.M. Dhuldhoya, President-Elect of the Bombay Chamber said that there was considerable decline in the incidence rate of reportable accidents in the country. He highlighted the need for training in specific technical functions to ensure safety and undertake safety audit, risk analysis, environmental monitoring and specific diagnostic tests.

He also emphasized the need to change the perception and attitude of workers to safety. He said that Bombay Chamber had set up a Safety, Health and Environment Cell to offer assistance to its members and others in the area of safety.

Mr. V. Ramadurai, President, Thane-Belapur Industries Association, called for a dialogue between the government and industry for constructive co-operation and meaningful regulation to ensure safety. He said that his association had undertaken safety audit scheme before the legislation was enacted. Mr. Z.F. Lashkari of Indian Chemical Manufacturers'Association said that his association had published a number of books and booklets to educate and ensure safety in chemical industry. He said there should be co-operation and co-ordination between Chambers and Associations to put forward the point of view of industry. Dr. O.P. Mittal, Chairman of the Panel on Safety Standards, Bombay Chamber, proposed a vote of thanks.

Rs. 360-cr. RELIEF FOR GAS VICTIMS

The Government announced interim relief of Rs. 360 crores to five lakh victims of the 1984 Bhopal gas tragedy.

The relief will be paid at the rate of Rs. 200 a month for three years to those in the 36 severely-affected municipal wards of Bhopal affected by the disaster on December 3, 1984, the Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy, said in a statement.

The disbursement of the interim re[...] will be through the administra[...] machinery of the Madhya Pradesh G[...]ernment and payments will be thro[...] banks in the area on a monthly ba[...] Relief to minors and adults will be m[...] at the same rate.

The disbursement of final compen[...]tion may take considerable time and [...] victims, who have suffered for over [...] years, cannot be asked to wait [...] further, the Minister said. This paym[...] may help the victims in meeting m[...]ical expenses and in acquiring a b[...] livelihood on a continuous basis, [...] added.

The money will be released sho[...] and payments will start at the earli[...] the Minister's statement said. "In ar[...]ing at the decision on interim relief, [...] Government has also consulted [...] social action groups representing all [...] victims of this disaster and they are [...]isfied with this arrangement that [...] Government is making."

PANEL TO ENSURE ECOLOG[...]CAL SAFETY SET UP

The government has constituted [...] environmental monitoring committe[...] ensure effective adherence of ecolo[...]cal safeguards in irrigation, multip[...]pose and flood control projects. Hea[...] by Mr. M.S. Reddy, member (wa[...] planning), Central Water Commissi[...] The committee has the representati[...] of ministries of water resources, ag[...]culture, environment and forests, w[...]fare and the Planning Commission, [...] director (environment) of the Cen[...] Water Commission is the memb[...] secretary, according to an offi[...] release. The committee has be[...] empowered to invite representati[...] from other related organisations l[...] Botanical Survey of India if a speci[...] situation demanded it. Any case [...] default in adhering to the ecologi[...] directives would be brought by [...] committee to the notice of the Planni[...] Commission and concerned ministr[...]

OCIL EXPANSION

Report on eco impact sought

The Union Industry Minister, Mr. jit Singh has sought a detailed report n the environmental impact of the xpansion project of the National Organic Chemical Industries Limited Nocil) at Thane in New Bombay.

In a letter to the Minister of State for Environment, Mrs. Maneka Gandhi, Mr. Singh has asked whether the detailed environmental impact assessment and isk assessment reports had been eceived by her. He also inquired whether Mrs. Gandhi had received a omprehensive report on the carrying apacity of the Thane-Belapur belt and une.

Mr. Singh pointed out that for not omplying with the primary condition f environmental clearance, the letter of ntent granted to the company might ave to be cancelled. Mr. Singh's letter omes in the wake of some representaons against the grant of the letter of tent to Nocil, official sources said. The inister said the proposed large-scale pansion of Nocil in New Bombay at present location had become a matter serious environmental concern.

On the basis of the Environment inistry's comments, the Cabinet ommittee on economic affairs had proved the grant of letter of intent for project subject to certain conditions, e of which was that "no construction tivity relating to the proposed expann would be undertaken until envirnental clearance... is approved by Environment Ministry". Mr. Singh ped that a comprehensive analysis of environmental problems involved uld be undertaken by the Environnt Ministry before a final decision s taken in the matter.

REEN SIGNAL FOR RCF MMONIA PLANT

Even as dust is being raised over the clearance to Nocil's expansion project, the Ministry of Environment and Forests has accorded approval to yet another proposal which had been hanging fire for several years. This proposal pertains to the rehabilitation of the "Suphala" and ammonia plants of the State-owned Rashtriya Chemicals and Fertilisers (RCF) at Chembur in Bombay.

Following widespread protests against the plant for the last several years, the Ministry had set up a committee to review the environmental status and operation of industrial units along with the expansion proposals. The committee in its report, recommended the proposal following which the Environment Impact Assessment (EIA) study of this project was appraised by the Environmental Appraisal Committee (EAC). This committee also recommended clearance to the project from the environmental angle, subject to certain specific and the usual standard conditions.

The opposition to the project from the residents and the municipal corporation, it is said, is because of the fact that the land in question at Chembur would be more lucrative for real estate development. In fact, the profits from it as real estate would be much more than the cost of the plant itself, it is said.

Apart from adhering to the stipulations made by the State authorities, RCF has been told not to increase the throughput at the Chembur unit. They have also been told to transport the products, urea and phosphates, only by rail except for short distances. Road transport for short distance consumers must be restricted to 10 per cent. The storage of ammonia must not exceed 3,000 tonnes at the premises and 6,000 tonnes at the jetty and automatic safety alarms should be installed. The project authorities must not use gypsum and other hazardous solid wastes for reclamation of low lying areas in the factory and ammonia should be imported only for consumption in the factory. The other conditions pertain to submission of reports on purge gas recovery and acid deposit rate, setting up of air, water and gas monitoring stations.

Courtesy: Financial Express

CHERNOBYL AREA DECLARED DISASTER ZONE

An emergency session of the Mogilev regional Soviet of People's Deputies has declared the radiologically contaminated Moglieve region of Soviet Byelorussia a disaster zone.

The session was dominated by discussions on ways to implement the government programme to eliminate the consequences of the Chernobyl nuclear power plant accident.

The situation in the contaminated areas of the Mogilev region seems to have aggravated. The local population is determined to leave, especially families with children. But, they have no place to go, although the Government resolutions have spelt out how much housing should be provided for the evacuees in definite areas.

The houses are without proper facilities and need to be repaired. No less than 7,000 families must be resettled this year.

PANEL TO STUDY POLLUTION ISSUES

The Tamil Nadu Pollution Control Board and the State Small Industries Association have together formed a Joint Standing Committee to examine all pollution control issues.

It is headed by Mr. P.M. Belliappa, Chairman of the Pollution Control Board, Mr. Dhanapallan, Secretary of the Industries Association is the convenor.

Expansion preferred to new refineries

An alternate option of allowing expansion of existing refineries in place of greenfield sites to cut costs is being examined by the Planning Commission and the Petrochemicals Ministry.

The idea being floated around is to allow expansion of select refineries under Indian Oil Corporation (IOC), Hindustan Petroleum and Bharat Petroleum by around 12 million tonnes which should cost around Rs. 500 crores excluding pipeline expenditure.

If this is included, costs could rise to around Rs. 800 crores and refineries are flush with funds to execute the idea. It will also nullify the need to go for either foreign collaboration or even spend foreign exchange as public sector refineries have enough technical capacity to be on their own steam.

The refineries have also had talks with the Government on the issue and are quite confident. A lone demand being made by them is dropping the idea of railway lines to carry either crude or petroleum products as pipelines are by far the better and safer alternative.

The existing refining capacity as of 1989-90 is put at 52.18 million tonnes and could have gone up by the end of the Seventh Plan to 54.05 million but for non-implementation of the Bongaigaon refinery. The Planning Commission has estimated refining capacity to rise to around 61.20 million tonnes by the end of the 8th Plan and this can be achieved economically if Government opts for expansions rather than new ones. Presently, there are 12 refineries and even if one million tonnes each is allotted, total refining capacity by the end of 8th Plan will be 64.18 million tonnes.

Industry sources admit to the exercise which could imply placing joint sector Mangalore and Karnal refin on hold. Reports suggest that the I have had long talks with Pla Commission members over their p set up a three million tonnes ref linked to a 2.5 lakh tonnes per a integrated cracker complex c Rs. 1,400 crores inclusive of a fo exchange component of Rs. 400 c

Karnal refinery, if it is a turnkey ject of Russians, could well Rs. 2,000 crores for 6 million tonn annum. Pricing of petroleum pro from these two new refineries make it difficult for the Governm sell. In addition, these refineries have to continuously import cru

It is not as if expansions of ex refineries do not need imported c Rather, downstream products co more economically priced, as pe cost drops.

It is now about three years Mangalore and Karnal refineries talked off and there could be pol pressures to go for greenfield sit Mr. Ramakrishna Hegde, Mr. G Fernandes and Mr. M.S. Gurup wamy are the political backers of galore, Karnal refinery has the ba of mr. Devi Lal. It may be tough o Planning Commission members to ministerial pressures though on th of it expansion seems to be a option. The Planning Commission against Karnal or Mangalore but would like to go slow on these pro

GFCL PLANS NEW PLANT KAKINADA

The Godavari Fertilisers and C icals Ltd. (GFCL) is planning to a Rs. 300-crore phosphoric aid pl Kakinada in A.P. A joint sector ve of the State Government and IF the plant would meet the require for manufacturing DAP and over the fluctuating price and supply p of phosphoric acid in the interna market, the GFCL press release

DIGENOUS SUPPLY FOR OIL SECTOR

Price preference rates to be revised soon

The Petroleum Ministry is considering revising the rates of price preference ffered to the indigenous suppliers of quipment to the oil and natural gas ector. The committee on indigenisation eaded by Mr. Vijay Kelkar which is urrently going into the entire gamut of naximising indigenisation in the petroleum sector is expected to announce the ew rates soon.

Mr. S. Chaliha, Chairman and Managing Director, Oil India Ltd. (OIL) nd also a member of the committee aid at Calcutta recently that the Indian ndustry was being offered the advantge of price preference of 15 to 35 per ent over the foreign firms at sliding ates, depending on the quantum of alue addition.

This formula had created an anamlous situation whereby a manufacturer ith a low value addition of 25 per cent as offered the same rate of price dvantage as the one which had hieved over 50 per cent value addion hampering progressive indigenisaon, Mr. Chaliha said.

Most of the Indian manufacturers, he d, were taking advantage of this situon and getting the maximum price vantage despite low indigenisation. r. Chaliha was addressing a seminar "Business opportunities in oil and s" organised by the Confederation of gineering Industry (CEI).

Mr. Chaliha said that to date, the total mulative value of indigenisation was imated at Rs. 5,000 crores of which . 2,500 crores related to the last five rs. This reflected the large foreign change outgo on account of purchase equipment and services.

Pointing out that the combined Eighth n outlay for the Oil and Natural Gas mmission and OIL was expected to pegged at Rs. 20,000 crores, he said that the Indian engineering industry had a major role to play in meeting the requirements of the oil sector.

The major areas where rapid indigenisation could come into play were geoscientific equipment and materials, drilling equipment, well head equipment, drilling and production consumables, production equipment, crude oil transportation, natural gas handling plants, pollution control equipment, material handling equipment, valves, pipes and fittings and offshore services.

Mr. Chaliha said that it was the time Indian industry paid attention to the disturbing trend where the manufacturers even after making supplies took inordinate time, as long as two years at times, to make spares available to the oil companies. In his address, Mr. A.K. Gupta, regional director, ONGC, outlined the Eighth Plan programme of the company.

He said that of the Eighth Plan outlay of Rs. 20,000 crores that was likely to be fixed for ONGC, investments in Assam would be to the tune of Rs. 2,100 crores, Tripura Rs. 350 crores and West Bengal Rs. 132 crores. About 3250 wells were to be drilled in the next five years against 3953 drilled by ONGC. Mr. Gupta said that 150 rigs would be installed by the end of the 8th Plan as against 220 put up till date.

Giving a break-up of the investments, Mr. Gupta said that project and services would account for Rs. 9,000 crores, equipment Rs. 5,000 crores, services Rs. 3,700 crores, offshore platforms Rs. 4,600 crores, production installations Rs. 1,035 crores, Chemicals Rs. 4,000 crores, telecommunication and telemetry Rs. 70 crores, computers and computer software Rs. 40 crores and land and building Rs. 350 crores.

NATURAL GAS

GCCI plea for fair price formula

The Bureau of Industrial Costs and Prices (BICP), which is evolving a new formula for the price of natural gas, should fix it in such a manner that is "just and fair", taking into account the huge profits made by the Oil and Natural Gas Commission (ONGC), the Gujarat Chamber of Commerce and Industry has pleaded.

Addressing the annual general meeting of the Chamber, the outgoing president Mr. Dilip Parikh pointed out that the present price of gas is prohibitive and discriminatory.

He said the price should be revised and refixed at Rs. 850 per 1000 cubic metre on the basis of heat equivalent of coal.

Mr. Parikh was not present due to his pre-occupation with assembly elections. His address was read out.

He said it was regrettable that though huge quantity of gas is available from Gujarat, it is not being supplied to industries, power projects and domestic consumers at reasonable prices. The benefit of natural resources (hydropower) which is available in Maharashtra and Karnataka should be available to Gujarat as well, by ensuring adequate and regular supply of gas found from or near by its territories. It is unfortunate that on account of lack of transport facility, Rs. one crore worth of gas is being flared-up.

Mr. Jagdish Jhaveri, the new president of the Chamber expressed concern over the possibility of limiting the size of the Eighth Plan because of resource constraint. He said this would lead to demand oriented development resulting in creation of imbalances.

He welcomed the planning commission's objective of achieving "growth with equity", but there was no indication about the resources availability or the targets fixed for various sectors.

Regarding industrial sickness, Mr. Jhaveri said the outstanding dues from sick units amounted to Rs. 7,000 crores, equal to 8.33 per cent of the aggregate advance of commercial banks. Effective steps should be taken for resolving the problem of sickness. He suggested that a separate insitution be set up for the purpose.

Mr. Jhaveri urged the Central government to quickly sanction the project for extending the Ahmedabad-Baroda express way to Bombay for the rapid movement of traffic between Ahm[edabad] and Bombay.

OIL STRUCK AGAIN IN KAIKALUR

The Oil and Natural Gas Commis[sion] has found oil and gas again in a we[ll at] Kaikalur, near Gudivada, in the on[land] Krishna-Godavari basin in Andhra [Pra]desh. The find was made some [...] ago. While the oil is flowing at a[...] 500 barrels a day, the gas yield is a[...] 9,000 cubic metres a day. The ON[GC] had struck oil earlier in another we[ll at] Kaikalur but the yield was not subs[tan]tial.

The latest find at Kaikalur-7 [con]firmed the hydrocarbon potential o[f the] area, sources said. Production of c[rude] oil would begin as early as possible. [The] oil is of good quality. Already, there [have] been oil finds at Bantumilli and L[ing]ala in the onland Krishna-Goda[vari] basin. Oil and gas were struck at B[an]tumilli in February, 1989, 33 km no[rth]east of Machillipatnam and produc[tion] of crude began a few weeks later.

Later, there was a "rewarding" [...] at Lingala, near Vijayawada where [the] well yielded a substantial quantit[y ...] 600 barrels of oil a day. The Lin[gala] well was put on production immedia[tely] after the strike, using the zero-d[...] concept.

Fresh exercise to fix new refining capacity

The petroleum ministry has initiated a fresh exercise to decide on the new refining capacity required to be created to meet the deficit in petroleum products as well as the quantities of crude oil and petroleum products to be imported.

An inter-ministerial group has already started looking into different aspects of the problem in view of the resources constraints and delay in projects which has already taken place. Based on the recommendations of the group, a paper setting out the options available will be prepared by the minstry. Secretaries of the ministries of petroleum, finance, and the Planning Commission will then decide on the investments to be made in the new refineries required for the eighth and ninth plans.

Lack of resources has been identified as a major constraint in setting up new refineries in the country. Last year the petroleum ministry had proposed setting up of three new grassroots refineries —one each in eastern, central and western India — to be taken up in the Eighth Plan. Much publicity was given to these projects as joint sector projects and offers invited from private sector parties to participate in them. Those who submitted the offers, included UB, Reliance, Essar and Sanjay Dalmia groups.

These were to be in addition to the three joint sector refineries at Karnal, Mangalore and the Assam (accord) refinery which were conceived as Seventh Plan projects but have so far remained on paper only though just about a month is now left before the Seventh Plan period comes to a close. While the Assam (accord) refinery was originally intended to be in the private sector, it was made into a joint sector project between the Central and Assam governments in view of the poor response from the private sector. The Mangalore refinery and petrochemical project is a joint venture between the Aditya Birla group, and the Hindustan Petroleum Corporation Limited (HPCL), while the Karnal refinery is another joint venture between Tatas and the Indian Oil Corporation (IOC).

Despite almost all the big names in the Indian corporate world — Tatas, Birlas, Reliance, UB, Essar, and Dalmias — being in the race for a share in one refinery or the other, no progress has been made so far.

Seeing the snail's pace at which the refinery projects were making progress, the Planning Commission had asked to the petroleum ministry to prioritise the refineries it proposes to set up in the Eighth Plan. It was indicated to the petroleum ministry that out of the three new grassroots refineries proposed by it for central India, western India and eastern India, there was scope for hardly one. It is in this context that the petroleum ministry has initiated a fresh exercise to determine the new refining capacity to be set up in the country.

Despite a few meetings since the new government took over power at the Centre: the tangle between Tatas and IOC, which is now about two-and-a-half years old, has not been resolved. Similarly, there are doubts about the Mangalore refinery and petrochemical project which are yet to be cleared. According to the original proposal, this refinery is to have a capacity of three million tonnes. Experts have, however, pointed out that a three-million-tonne capacity refinery will not be an economical one. The capacity of the refinery should be increased to six million tonnes which will save 20 per cent on investment per additional tonne of crude. It will also be more beneficial for the petrochemical project, as the entire naphtha requirement of a minimum economic size naphtha cracker of three million tonnes can then be met from the same refinery.

The petroleum ministry has to take decisions on these aspects soon. It has also to decide whether the refinery projects should be a joint venture at all between public and private sectors. There is a view which favours abandoning of such a joint venue concept, since it has failed to serve the purpose for which it was conceived.

According to petroleum ministry's estimates, the demand for petroleum products is expected to grow to a level of 77.7 million tonnes per annum by the end of the Eighth Plan and to 101.3 million tonnes by the end of the Ninth Plan. Against this, the refining capacity by March 1990 (end Seventh Plan) is expected to be only 51.85 million, up from 45.55 million tonnes at the end of the Sixth Plan. It would, however, still be short of the Seventh Plan target of 54.05 million tonnes.

The growing demand for petroleum products is proposed to be met by three refineries which have remained only on paper during the Seventh Plan period, but can be completed within the Eighth Plan. Of these, the Karnal refinery is to have a capacity of six million tonnes and Mangalore and Assam refineries three million tonnes each. In addition, half a million tonne per annum refinery is proposed to be set up at Narimanam in Tamil Nadu. Certain low-cost expansion projects at some of the existing refineries have also been identified by the petroleum ministry. The Koyali refinery is proposed to be expanded by three million tonnes, Cochin refinery by two million tonnes, Barauni and Madras refineries by 0.90 million tonne each and Guwahati refinery by 0.15 million tonne. The three new grassroots refineries for eastern India, central India and western India, which were given wide publicity last year, have run into trouble. The location for these refineries has not been finalised yet. According to the petroleum ministry, even if work on these projects is initiated immediately they are likely to be commissioned only in Ninth Plan period and would help cover the product demand growth anticipated during that period only.

Haldia Petrochem MoU Signed

A memorandum of understanding (MoU) for the Haldia petrochemicals project was signed recently, between the West Bengal government, West Bengal Industrial Development Corporation (WBIDC) and Tata Tea Ltd.

The shareholding pattern under the new joint sector agreement will be 26 per cent WBIDC, 24.99 per cent Tata Tea while 49.01 per cent would be offered to the public.

According to Dr. Asim Dasgupta, state finance minister, a broad agreement on the participation of the financial institutions had already been reached, Mr. Darbari Seth, chairman of Tata Tea had a round of talks recently with Mr. S.S. Nadkarni, chairman IDBI on the matter recently. According to Dr. Dasgupta, the state government had signed the MoU within a month of the chief ministers assembly statement that the main Haldia petrochemicals project would be set up with the Tatas and not with the earlier co-promoter, Mr. R.P. Goenka. He claimed that the MoU formalities had been finalised "in a record time".

He thanked Mr. R.P. Goenka for handing over the old letter of intent for the project. An application for a fresh LI had been sent by the state government to the Centre on February 12 and Dr Dasgupta hoped that it would receive an expeditious clearance from a "friendly" government at the Centre. He said that discussions were still going on with Mr. R.P. Goenka regarding payments on the expenditure incurred by HPL in the last few years.

Both the state government and Tata Tea had decided that work on the project should start immediately. Preliminary work was to begin from March before the monsoon. Mr. Darbari Seth would be visiting Haldia site for a survey. The chief secretary, Mr. Tarun Dutt signed on behalf of the state government while Mr. Seth signed for Tata Tea. The newly constituted six member committee to look after the project, will consist of Dr. Bikram Sarkar, secretary for commerce and industries, Mr. S.N. Roy, finance secretary and Mr. Subir Dutta, managing director of WBIDC on behalf of the state government while Mr. Daljeet Sabiki, Mr. R.K. Krishna Kumar and Mr. Subroto Ganguly will represent Tata Tea.

Meanwhile, it was learnt that the new MoU has the format of that of the Karnal refineries promoted jointly by the Tatas and IOC with certain modifications. The modifications were suggested by West Bengal government and they were readily accepted by the Tatas.

Unlike the former MoU signed by WBIDC and the R.P. Goenka the present one had a third signatory — the state government. The state government, like the Union government in the case of the Karnal project, would oversee the project without participating in the share equity.

Informed sources said the fresh LI from the centre should reach the state government.The IDBI funding pattern was also likely to be finalised within the same time frame.

HALDIA PETROCHEM: GLOBAL TENDERS LIKELY FOR TECH COLLABORATORS

The West Bengal government is likely to float global tenders to select the technical collaborators for Haldia Petrochemicals. This was indicated to a group of West German delegates who met the state finance minster Dr. Asim Dasgupta recently.

A team from the economic committee of the West German Parliament led by Mr. Hermann Unland offered German help in technical collaboration. Dr. Dasgupta, reportedly found the offer quite "competitive" but said a final decision regarding the choice of collaborator would be taken after goin through the proposals received fro global tenders.

The state also held discussions wi the team about possible German aid t some of its ongoing projects. The tea assured the government that it woul make efforts so that the assistance coul come according to the rules of the bila eral agreement between the two coun tries.

The team also sought the help of th state so that it could influence th Centre on the restrictions imposed o German businessmen through th "single entry" permits. The Indian bus inessmen, on the other hand, enjoyed th multi-entry visa facilities in West Ger many.

ASSAM CRUDE ROYALTY TO GO UP

The rate of royalty on Assam crud is likely to be raised to Rs. 390 o Rs. 395 per tonne from the current rat of Rs. 192 per tonne. It is authoritativel learnt that the decision to increase th rate was taken after a detailed discus sion between the Assam chief ministe Mr. Prafulla Kumar Mahanta and Unio Petroleum minister Mr. M.S. Gurupad aswami in New Delhi. The recom mended hike will now be sent for th Prime Minister's approval and will b announced in the ensuing budget ses sion of parliament, it is learnt. At presen Assam is getting royalty at the rate o Rs. 292 per tonne, after the recen announcement of the Prime Minister t grant an interim and tentative hike o Rs. 100 per tonne. The question of util isation of the arrears due to increase royalty with retrospective effect fo repayment of central loans was howeve not included in the discussion.

Similarly, the issue of the propose gas cracker in Assam too came up fo discussion with Mr. Gurupadaswami but a further discussion of the matter o a subsequent date was assured.

Plea to cut duty on capital goods

The PHD Chamber of Commerce and Industry (PHDCCI) has suggested a reduction in duty on capital goods for ensuring strong, efficient and low cost capital goods manufacturing sector.

In its pre-Budget memorandum, the chamber President, Mr. R.K. Somany, has said that though capital goods industry had a wide base, price wise it was costly particularly due to high duty incidence even after getting Modvat on its inputs.

He said though the Government had been strongly resisting against duty exemption on revenue considerations, the chamber felt that the revenue loss arising out of duty reduction on capital goods would be more than made-up by a spin off effect on not only the capital goods sector but on the user industry as well as the consumer. The chamber also called for excise duty rebate on incremental production to encourage the manufacturers to aim for higher productivity, which would reduce cost, and the Government would earn more revenue while the consumers too would be benefited.

To begin with the base production level could be calculated on the basis of a rolling average of the production of the unit in the last three years including zero production period. The chamber also urged the Government for an integrated package of supportive measures for promoting industries in backward and rural areas. It would have many socio-economic gains like the development of those areas including infrastructural service and marketing, open up employment avenues, reduce disparities and check the present influx of rural population to urban areas.

The industries set up in the backward regions suffered in terms of higher project cost and operational costs as compared to similar industries set up in well connected and developed centres, the chamber president said.

To reduce the project cost in such cases as a promotional measure, the chamber recommended that all plant and machinery purchased by such units be fully exempted from central excise duty and initially on products manufactured by such industries be given a concessional rate of excise duty for a limited period.

PHDCCI also suggested adoption of a principle, charging duties at specific rate on all excisable goods and the specific rate should be charged at the lowest realistic level only. The memorandum also pointed out that central excise multiplicity of rates on ad valorem basis had been some of the major areas which had contributed to the distortions and complexities.

Hence, moving to more of specific rates was desirable in the interest of simplicity, better revenue collection and to reduce the scope for disputes and unnecessary harassment to assessees. Regarding Modvat, the chamber felt, it had been useful, but implementation-wise the industry was still facing pinpricks including sometimes denial of Modvat.

POST-SHIPMENT DOCUMENTS BEING SIMPLIFIED

The commerce ministry has initiated action on simplification of post-shipment documentation. As in the case of pre-shipment operations, exporters may have to prepare only two master documents. At present, they have to furnish about 30 forms to complete the post-shipment operations. The post-shipment documentation, according to official sources, is less complicated than the pre-shipment procedure, though the number of documents to be furnished by exporters is more. The exporters have to prepare about 30 documents for post-shipment of cargo.

The ministry has just started work on simplification of post-shipment documents to reduce further the burden of paper work on the exporting community. Reduction of documents to be prepared by exporters will enable them to devote more time to export promotion rather than waste energy in preparing the large number of forms to claim benefits like cash compensatory support. After the post-shipment simplification is completed, the exporters should be able to spend their resources and energy more on export production and marketing than in meeting the demands of archaic procedures, the sources point out.

An important aspect of the simplification of export documentation is that the staff would have to be trained for the purpose. The commerce ministry will organise the training programme in consultation with the concerned agencies.

The exporters, however,would have to wait for quite some time before they are able to take full advantage of the simplification of the pre-shipment as well as post-shipment documentation. The pre-shipment simplification, however, is to be effected without much loss of time as the government has already approved the simplification of preshipment documentation.

TINY COSMETICS UNITS SEEK DUTY SOPS

The small-scale cosmetics and toiletries industry has appealed to the Union Government for duty concessions on par with that given to general sector small-scale units.

In a memorandum to the Union Finance Minister, the industry has stated that the present excise exemption limit of Rs. 5 lakhs compared unfavourably with Rs. 15 lakhs to Rs. 30 lakhs permitted for other small-scale units. It also wanted to concessional duty of Rs.15 lakhs to be raised to Rs. 75 lakhs or more as enjoyed by the general sector small-scale units.

SPOTLIGHT ON

Biotechnology & Life Sciences (Part 1)

BIOTECHNOLOGY IN AUSTRALIA

Australia has a good research base in biotechnology fostered by decades of government funding and driven by the practical needs of the agricultural and health care sectors.

Australia has a wide network of government funded R & D institutions in addition to those of private companies and institutes, Federal Government R & D expenditure is estimated to be in excess of $ 100 million a year.

The strength of the research base is evident by the number of research centres enjoying international reputations. These include many university based research centres and research institutes such as the Walter and Eliza Hall Institute; the Howard Florey Institute, the Queensland Institute of Medical Research and the Garvin Institute.

Australian universities are extremely active in biotechnology research and excellent opportunities exist for companies to work with universities and tertiary institutions using their technology transfer companies as a vehicle. The depth and diversity of Australia's research effort has produced a number of high profile technologies, products and processes, some of which have been significant breakthroughs.

Australia's research capabilities are particularly strong in agriculture and human health; especially in immunology and endocrinology. Australia is currently developing a number of human and animal vaccines. Scientists at the Walter and Eliza Hall Institute and the Queensland Institute of Medical Research are world leaders in the development of a menozoite malaria vaccine. Enterovax Ltd. has received encouraging results from human challenge trials with the world's first genetically engineered live oral cholera typhoid vaccine.

Biotechnology Australia is marketing a vaccine for pig scours and is developing a number of animal vaccines including vaccines against ticks, nematode parasites in sheep and avian coccidiosis.

In agriculture, a new technology for the direct cloning of the plant embryo — enabling numerous hybrid plants to be obtained from the one embryo — has prospects for new plant strains. Australia also developed and 'jumping gene' technique for use in selected plant species. The 'Gene Shears' method for selectively inactivating gene activity in plant and animals was discovered by CSIRO scientists and has the potential to revolutionize biotechnology.

The strength of Australia's research capability in the biosciences offers a real opportunity for overseas investors seeking to develop strategic alliances with Australian biotech companies. (*Australian Export News Sept/Oct* '89, p. 5).

THREE HOUR PORTABLE EMBRYO-SEXING KIT DEVELOPED

A portable kit to sex animal embryos and split them to double their numbers has been developed by a team at the Australian National University in Canberra, Australia. The procedure takes around 3 hours and can be carried out on the farm, while the kit sells for around Aus $ 9500 ($ 7,300). The sex of seven-day-old embryos can be determined quickly and easily, and it is believed that double the number of offspring should be produced by embryo splitting. The sexing method involves using the polymerase chain reaction technique on DNA from cells from 7-day-old embryos flushed from artificially inseminated, super ovulated breeding cows. The test indicates a male embryo by the presence of the Y chromosome DNA sequence. Following sex determination, a simplified embryo-splitting procedure is carried out, and twin embryos are then transferred to surrogate mothers or frozen for future use, with pregnancy rates of 60-65%, for whole embryos and 55-60% for split embryos. (*Animal Pharm.*, 12/22/89, p.24).

MAMMALIAN CELL BIOREACTOR OF BIO TECHNETICS GOES INTO LIMELIGHT IN BIOTECHNOLOGY

As more and more biochemicals, such as monoclonal antibodies (MAB), diagnostic agents, blood clot dissolvers, become ready for commercialization, the producers will be facing a change of production concepts. Especially popular today is a mammalian cell culture, whereby mammal cells are grown and their secretions harvested as the product.

One key reason for its popularity is the mammalian cell bioreactor developed by Biotechnetics Inc. (San Diego, Calif). The approach of this bioreactor system is exceptionally suitable for scale-up, while also minimizing processing costs upstream and downstream of the actual cell culturing step.

Mammalian cell culture can take place in a batch mode, like most fermentation systems, or it can operate by continuous perfusion, whereby nutrients and oxygen are brought to the immobilized cells and the products and wastes are removed. The bioreactor of Bio Technetics uses the latter approach. The basic operating unit or core within the bioreactor consists of three compartments, one atop the other. The primary

compartment, which houses the cells, is sandwiched between a compartment for aeration and one for recirculation of nutrient. The aeration compartment is bounded on its top and bottom by hydrophobic membranes (separated by spacers), the nutrient compartment similarly by hydrophilic ones. Accordingly, the cell compartment is bound on the side (its top or its bottom) by a hydrophobic membrane or on the other side by a hydrophilic one.

The overall bioreactor consists of an appropriately manifolded stack of these basic units. During operation, the mammalian cells get their nutrient and give up their product secretions via diffusion across hydrophilic membranes and are oxygenated by gas diffusion across the hydrophobic membranes.

This decoupling of oxygenation from nutrient delivery is the major distinguishing feature of this bioreactor. Ordinarily, the necessary oxygen is instead delivered dissolved in the nutrient solution, and the low solubility of the gas requires a very high recirculation rate for the solution. This difference is oxygenation, along with the flat sheet configuration that promotes effective mass transfer, are the reasons for the case of scale up.

Among other features of this novel bioreactor are an economical nutrient preparation system whereby a concentrate is metered into a sterile water stream, and an automatic metre-filtration system that continuously concentrates the product. Since August 1987, the above bioreactor has been operating to product MABs on a mass scale. (*Chem Engg.*, 12/1989, p. 82).

MITSUI PLANT BIOTECHNOLOGY RESEARCH INSTITUTE INAUGURATED TO BOOST AGRO BIOTECH RESEARCH

In an endeavour to catch up with the USA in plant biotech research, 20 firms owned by Japan's Mitsui Group have created a new independent research institute by merging portions of their plant genetic engineering operations. The new company Mitsui Plant Biotechnology Research Institute, will seek to develop new strains of crops that are larger and more resistant to flood, drought, disease and insects.

He stressed that while the Japanese plant biotechnology industry is equal to the West's in tissue and cell level research, 'the Japanese are behind in basic research on plant DNA, so Japan must centralize to catch the West in this field'.

The real race in plant biotechnology, many believe, is to commercialize a genetically latered seed for a major cash crop such as rice, wheat or soybeans. Gary Barton, director of Science Communications for Monsanto Company (a leader in USA in plant biotech research) and a leader in plant genetics research, reports US companies are still ahead of the Japanese in biotech R & D, but this edge could be lost if the US government does not take a stronger stand in allowing testing for new seeds. (*Chem Eng. Prog.*, 11/1989, p. 12).

BIOTECH FACTORY FOR HYDROGEN PRODUCTION FROM BIOMASS ON THE HORIZON

A research group in Berlin has developed a method for supplying hydrogen from purple bacteria and a particular species of algae in a simplified and safe manner. With this development a biotech production of hydrogen from biomass looks promising.

Prof. Ingo Rechenberg, director of the Div. of Bionics & Evolution Technology at the Technische University, Berlin (Berlin Polytechnical Univ), is one of the pioneers in future energy economy based on hydrogen. Only 10 years ago, Rechenberg and his team succeeded in releasing hydrogen from biomass using purple bacteria. Continuing with this research, the researchers has now su cessfully employed the purple bacte and algae to release hydrogen fr biomass.

The bionic researchers in Berl orginally hoped to use photosynthesis a model for producing hydrogen. Duri this process, when sugar is produc from water and carbon dioxide, wa is split up by the energy derived fr sunlight. While the oxygen is release the hydrogen is virtually trapped in sort of 'molecular cage' so that it c no longer come into contact w oxygen before sugar synthesis and spo taneously form water again. It has r been possible, so far to open the 'ca as a basis for technical hydrogen p duction.

Subsequently, the Berlin research began to search for another process which hydrogen in produced. The p cess was found in purple bacteria t live on water and are non sulfuro These bacteria use the long wave r portion of the sunlight, which has gre leaves and algae in the upper layers the water do not require. In contrast, normal photosynthetic processes, th bacteria do not split up water i oxygen and hydrogen but was orga carbon compounds as hydrogen don to synthesize sugar. The sugar is la decomposed again into carbon diox and hydrogen. During this proc hydrogen is transformed under natu conditions together with nitrogen un the influence of an enzyme called nit genase into ammonia for the ensu protein synthesis. It is exactly this ability of the enzyme to stop the rele of hydrogen in the absence of nitrog which the scientists in Berlin h exploited in developing their meth

One of the drawbacks of this proc is that it releases huge amounts carbon dioxide. However, there i solution. For example, it is known t many algae deposit a major portion the sugar that is formed during nor photosynthesis into the water and th

algae can provide the bacteria with a nutritional source. Almost completely dissolved in water, the CO_2 generated by the bacteria during sugar decomposition is channelled back to the algae and serves as a basis for their photosynthesis. Purple bacteria and algae thus feed one another and sunlight serves as the motor of the process. Only the decomposition products of the water, oxygen and hydrogen are released from the culture. However, the bacteria and algae should not be mixed together, as the gases emanating would combine to form oxyhydrogen which is explosive. After, successfully feeding the purple bacteria with the organic wastes of the chlamydomonas algae, a photo bioreactor has to be developed in order to separate the liquid environment of the algae and bacteria. This ensures that oxygen and hydrogen do not mix and that the organic nutrients and the CO_2 can be transferred freely.

The design and operation of the photo bioreactor for purple bacteria in natural sunlight represent another developmental focus, as previous experiments have only been conducted in the laboratory. Seven different reactors are at present being considered. (*Urja*, 12/1989, pp. 19-20).

A SIMPLE BLOOD TEST (BASED ON POLYMERASE CHAIN REACTION) TO REVEAL SEX OF FOETUS

A test on a pregnant woman's blood can now show what sex her child will be. This will help doctors to counsel families who are affected by genetic disorders carried on the Y or male chromosome. In future, doctors should be able to apply the test to identify foetuses affected by other inherited diseases too. The test is possible because cells from the foetus enter the woman's bloodstream via the placenta. If the foetus is male, it is possible to detect cells derived from the foetus because these carry the Y chromosome, which determines male sex.

Doctors and researchers from the John Radcliffe Hospital and the Univ. of Milan in Italy developed the test using the technique known as the polymerase chain reaction. This amplifies known sequences of DNA, which may be present in the sample in minute quantities into detectable amounts. In this case, the team amplified sequences of DNA that form part of the Y chromosome, and which are repeated between 800 and 5000 times in each Y chromosome. To improve the accuracy of the technique the researchers amplified the DNA twice. On the second run, they looked for stretches of DNA that they knew lay inside the segment that they had amplified.

The researchers looked for DNA specific to the Y chromosome in 19 pregnant women who were between 9 and 41 weeks pregnant. The test found such DNA in all 12 women who were carrying the male foetus, but none of the 7 with a female.

The main application of the test at present is to tell the sex of a foetus in families affected by sex-linked disorders, such as haemophilia. This aminocentesis (sampling the fluid surrounding the foetus in the womb) or chorionic villus sampling (taking the cells from the placenta via the vagina). Both methods may pose a risk of miscarriage or infection. But with the new method, it would only be necessary to consider ammiocentesis or chronic villus sampling to determine whether the foetus had inherited the disease if the blood test had first shown that the foetus was male. (*New Sc.*, 12/16/89, p. 20).

PHARMACEUTICAL PROTEINS GROWN IN SPACE FOR RESEARCH ON NEW DRUGS

Experiments on board NASA's space shuttle show that the best protein crystals do indeed grow in space as some scientists had predicted. This opens up the possibility of obtaining the structure of proteins more easily. Until now such research has been difficult because of the difficulty of growing flawless crystals in Earth's gravity.

Charles Bugg from the Univ. of Alabama, and has colleagues, sent up an experiment on the space shuttle in September 1988. Technicians on board grew 11 types of protein crystal. Several turned out to be of much higher quality than those grown by an identical method on Earth.

Three of the proteins — gamma interferon, porcine elastase and isocitrate lyase — were so flawless that several pharmaceutical companies have expressed an interest in them. They hope use the information about their structure to design new drugs for treating cancer and emphysema and for killing parasite worms. Scientists obtain the structure of a protein by scattering x-rays off its crystal, in a technique known as x-ray crystallography.

To grow the crystals in space, the researchers of the Univ. of Alabama supplied a piece of equipment they had developed for experiments on previous shuttle flights. It consists of a double barrelled syringe, with one barrel containing protein, solution and the other containing precipitating solution. Crystals grow at the tip of the syringe where droplets of the solutions mix.

Technicians on the shuttle used the equipment to grow crystals. When they had formed, they withdrew them into the syringe, sealing them until the shuttle returned. They monitored the process by taking photographs every 24 hours.

The researchers at laboratories in USA and Britain (including Merck, Sharpe & Dohme, Du Pont and Wellcome) repeated the procedure for growing crystals with identical solutions, under conditions of normal gravity in a laboratory on Earth. When they compare x-ray photographs from the two sets of crystals, they found that the

x-rays of the crystals grown on space were much sharper. This seems to be because the molecules in crystals grown in space are more ordered than those grown on Earth.The reason for the difference seems to lie in the convective currents that are set up when crystals grow. As the crystals precipitate out, they leave behind a solution which is increasingly less dense. On Earth, gravity causes this solution to flow away continually from the growing crystal. This means that the crystal grows unevenly, and will not diffract x-rays clearly enough to allow scientists to understand its structure. Another advantage of growing crystals in space is that they are larger. On Earth, convection jogs the proteins into forming crystals earlier, so they are large in number but small in size. Proteins seem to be particularly susceptible to the effects of gravity because their molecules are only weakly bonded. The scientists are planning to grow more crystals on the next shuttle flight, scheduled for December 1989 and due to last for 10 days. Although the possibility of growing crystals in space on commercial basis is remote but researchers are interested in the technique and future space flights will see further trials with this technique in space. (*New Sc.*, 12/18/89., p.21).

VINICULTURE LOOKS TO GENETIC ENGINEERING TO SOLVE THEIR PROBLEM

Good grapes, the right soil and French know-how make for a good Bordeaux wine. But in a project which could become a test case for genetic engineering in Europe, viniculturers in France and elsewhere are turning to DNA to help them to solve a persistent problem which wastes millions of litres of good wine every year. About two-thirds of the wines produced today employ 'starters' — yeasts added at the beginning of fermentation, which help to control quality. Most growers rely on commercial yeasts prepared to precise specifications. They buy these yeasts from concerns such as the Canadian company L'Allemand in Montre which is the biggest supplier in t world.

Now the company has applied to t French authorities for approval to te genetically engineered yeast in expe mental vats in France. As the techniq involves the use of genetically engi ered products in the production of fo for human consumption, this case co set a precedent throughout Europ Richard de Gre, L'Allemand's pre dent, does not expect the authorities grant approval before September 199 Wine growers find that many musts a spoiled by rogue yeasts carried on t skins of harvested grapes. These 'kill yeasts' proliferate during fermentati and emit toxins which can kill the co mercial starters and spoil the flavour the wine. In the past there was no ea way to prevent such contaminatio Sometimes the yeasts even added ne flavours that turned out to be valuab So growers often turned the rog yeasts into the next year's starters, a today two-thirds of commercial wi yeasts include genetic stock from su 'tame' killer types.

The tame varieties still produce toxi but these do not affect the wine's fl vour. They even help to control cont mination by killing off some of t rogue yeasts on the harvested grape But they do not kill all of them. No L'Allemand wants to transform co mercial strains that are still sensitive attack by other rogue yeasts into co pletely resistant types by genetic mani ulations. L'Allamand started its work this project with commercial varieties common killer strains and isolated t genes that produce the toxin. The co pany's scientists then combined on po tions of these genes in sensitive yeas to create new commercial varieti Tests showed that these yeasts we effective at resisting attack and pan of wine testers pronounced — the qu ity of small quantities of wine ma from these yeasts to be unimpaire (*New Sc.*, 12/16/89, p. 24).

Science Briefs

[I]NDIANS SYNTHESISE ANTI-[T]UMOUR AGENT

Indian scientists have emerged [s]econd in the world, next only to the [U]nited States, in synthesising Frederi-[c]amycin, an anti-tumour agent that has [r]eceived worldwide attention in recent [t]imes.

Since its discovery in the United States, Fredericamycin, which can be [o]btained from the fungus Streptomyces griseus, has evoked special interest in [o]rganic chemists because of its novel [s]trucure and biological activity.

The complex molecule was not men-[a]ble to large-scale laboratory synthesis [a]nd commercialisation owing to the [p]resence of a complex spiral molecular [s]ystem which baffled many scientists.

The anti-tumour agent intercalates [w]ith the single-stranded ribose nucleic [a]cid (RNA) molecules, unlike most [o]ther anti-cancer drugs that intercalate [w]ith the double-stranded deoxyribose [n]ucleic acid (DNA) found in the cells [n]ucleus. DNA and RNA play a crucial [r]ole in cells replication.

As almost 20 laboratories worldwide [st]rove to chemically synthesise this [u]nique molecule, scientists at the Indian [I]nstitute of Chemical Technology [(I]ICT), Hyderabad, recently reported [su]ccess in the field becoming second [on]ly to the United States in accomplish-[in]g this difficult task.

"We are the first in the world to [de]monstrate the spiral system that gives [so]me of its novel features, and the [se]cond to synthesise it in the labora-[tor]y." Dr. A.V. Rama Rao, IICT direc-[tor], said.

Two years ago, the IICT group were [the] first to unravel the complex spiral [sys]tem. They next planned a strategy [to]wards complete synthesis of the fredericamycin molecule by identifying the key intermediates in the process. Dr. Rao's group presented a paper on fredericamycin synthesis in a five-day international symposium on chemistry of natural products, in New Delhi in February.

The researchers have so far successfully synthesised fredercamycin molecule containing some protective methyl ether groups. Only the last step, involving demethylation, is left to yield a pure fredericamycin molecule. "This step will not take long, may be one to three months", Dr. Rao said.

IICT is working out an agreement with the National Cancer Institute in the United States for future collaboration in anti-cancer drugs. Indian scientists have the distinction of isolating thousands of natural, biologically active and important products. "But they missed a fortune as they did not do proper follow-up studies for biological screening owning partly to the lack of sophisticated techniques," Dr. Rao said.

The world tend nowadays is towards laboratory synthesis and "we are losing the art of isolation of compounds from natural organisms." Recently, IICT researchers also developed the process know-how for etoposide, an anti-cancer drug introduced abroad for treatment of lung and testicular cancer.

Etoposide is a semi-synthetic derivative of a natural product podophyllotoxin that can be isolated from Podophyllum emodii, a plant commonly found in Kashmir and the Himalayan belt in India.

--P.T.I. Science Service,
February 16-28, 1990

PLUMBAGIN PREVENTS ANTIBIOTIC RESISTANCE IN BACTERIA

Scientists may have found an answer to the problem of antibiotic resistance in certain bacteria, with new findings that plumbagin, a plant derivative, lowers this resistance. The development of chromosome-mediated resistance to various antibiotics is one of the major problems faced during prolonged chemotherapy against bacterial infections. Some compounds help to prevent drug resistance by combining with the DNA of the bacterial cells. Scientists at the Department of Microbiology, Osmania University, Hyderabad, studied the effectiveness of plumbagin, known to have anti-bacterial properties, in preventing antibiotic resistance in bacteria. They selected two bacterial strains, Escherichia coli and Staphylococcus aureus, and two antibiotics, streptomycin and rifampicin, for their studies.

Plumbagin is derived from the roots of Plumbago indica. Earlier it was reported to eliminate from bacteria the conjugative R-plasmid responsible. The researchers found that Staphylococcus aureus was ten times more sensitive to plumbagin than E coli. There was total inhibition of growth of E coli and Saureus in sytems containing streptomycin or rifampicin in combination with plumbagin. The findings by Rama Durga and coworkers were reported in the Indian Journal of Medical Research.

Plumbagin has been reported to have anti-cancer properties, owing mainly due to its intercalation with DNA which prevents mutations. It is therefore probable, that plumbagin has similar effects on DNA in blocking the development of drug-resistant mutations, the researchers say in the report.

--P.T.I. Science Service
February 16-28, 1990

SELF-EXTINGUISHING TREATMENT FOR WOODEN DOORS, WINDOWS

The Central Building Research Institute, Roorkee, has evolved a cost-effective chemical treatment for wood

that prevents it from catching fire and does not affect its quality. The new treatment is based on vacuum pressure impregnation of wood specimens with a reactive flame and glow retardant, dehydrating agent, corrosion inhibitor and fungicide. A pilot plant for the chemical impregnation, and unit for drying and curing the impregnated wood have been fabricated at CBRI.

The vacuum impregnation technique has been successfully employed on a number of small and large-sized doors, windows and partitions. A variety of wood specimens, like deodar, shisham, teak and mango were found to be satisfactorily self-extinguishing during trials.

Studies showed that after treatment, there was no ignition, no surface spread of flame and the quality of the wood remained untarnished. The treated wood could also be easily polished with spirit. The non-toxic treatment is economical and increases the cost of wood only by 10 per cent.

--P.T.I. Science Service,
February 16-28, 1990

US TESTING ANTI-AIDS CHEMICALS SYNTHESIZED IN INDIA

Several chemical compounds first synthesized in India are currently being tested in the United States as potential substitutes for 'AZT', the anti-AIDS drugs. Dr. Maitryee Debi, a Calcutta researcher, told the Indian Science Congress in Cochin that 63 compounds related to AZT in structure and synthesized by her at the Calcutta University's Department of Chemical Technology had been chosen by the Frederick Cancer Facility in the United States for anti-AIDS work.

The programme was initiated in 1987 as part of the AIDS anti-viral drug screening programme, Dr. Debi said.

The chemicals which she synthesized are all derivatives of pyrimidine as is the compound azidothymidine (AZT), the drug which is already in use on patients with AIDS.

AZT, however, is expensive and does not cure AIDS. It only increases the life-span of patients. This has kept the scramble for new anti-AIDS drugs on. In laboratory tests conducted in the United States, Dr. Debi said, her compounds were tested on the AIDS-causing human immuno deficiency virus (HIV), isolated from AIDS carriers.

She said it was, however, too early to decide whether these compounds could be used on AIDS patients. "Though they look promising, there is not enough data on their efficacy", she said. Dr. Debi said her entry into the collaborative programme was preceded by a three-year programme with the National Cancer Institute in Bethesda, Maryland, U.S., during which she sent chemicals synthesized by her for testing their anti cancer properties. She said she had synthesized 140 new compounds and had received requests from the American institutes to get them evaluated there.

--P.T.I. Science Service,
February 16-28, 1990

FLYASH: PUT TO CONSTRUCTIVE USES

Efforts by the Central Power Research Institute (CPRI), Bangalore, to set up a flyash utilisation plant at the Raichur thermal power station in Karnataka mark a step forward in the constructive utilisation of flyash — a waste product of thermal power plants that causes immense pollution problems.

Scientists at CPRI's materials research division have developed several processes for making value-added products from flyash including bricks, glazed tiles and building blocks; extraction of alumina and magnetite; and mixing flyash with cement.

Another flyash product under development at CPRI is the amazing tile th protects the American space shutt from the heat of re-entry. Currentl 50,000 acres of land are destroyed eve year for brisk making. Delhi city alo consumes 70 million bricks a year. U of flyash means saving of land that c otherwise be used for cultivating crop

Flyash is being increasingly put constructive uses worldwide. We Germany utilises 80 per cent of th flyash produced. Three-fourths of th flyash is converted into building mate ials in Denmark, where permission f construction of a thermal plant granted only after the owner of the pla agrees to set up a facility for flyash u listion. In fact, Denmark imports flyas and exports finished products.

Utilisation of flyash is 65 per cent France, 55 per cent in Britain, 45 p cent in Poland and 17 per cent in U.S.A India will have 90 million tonnes flyash available by the year 2000. A present power plants throw out 28 mi lion tonnes every year. In India, the Ta group has proposed to set up a flyas utilisation plant in collaboration wi Poland. Coal power plants at Neyve and Vijayawada will be the first in Ind to have flyash utilisation facilities.

CPRI scientist Dr. B.K. Chaturve says the upcoming demonstration pla at Raichur will show three ways using flyash. Low-value and hig volume utilisation, which does n require a particular grade or quality flyash, includes the development of fi material for land or used mine embankments, backfills, soil amend ments, sub-grade stabilisation, paveme base course and hydraulic fills.

The use of flyash as a fill mater offers the twin advantages of minimu processing cost and high rate of util sation. Flyash is being used in ro works on a large scale because of i light weight, stability, low active pre sure, negligible settlement and ease c

handling. Cement stabilised flyash is being used as a base for roads, car parks and as a premixed grounding material.

Flyash is also used for trenching because of its tendency to harden by itself, compactness and harmlessness to pipelines, since it remains unaffected by rainfall, construction engineers are using it in dams too. According to CPRI scientists, the institute has developed glazed bricks made of 50 per cent flyash, 20 per cent clay and 20 per cent feldspar. Traditionally, bricks are made by firing clay for at least 24 hours. Because flyash is already a 'fired' material, bricks made out of it require less than eight hours of firing thereby saving 60 per cent of energy.

Flyash bricks, containing about 70 per cent flyash and 30 per cent clay are several times stronger than conventional clay bricks. Medium value added utilisation of flyash is in cement and concrete industries and manufacture of light weight aggregates. Flyash in cement acts as a lime "Super Upper" and saves the concrete structure from disintegration. In the United States, flyash has been used widely as part of concrete in dams because it generates less heat, undergoes less volume change, is less permeable and has better freezing and thawing durability. Flyash has also been successfully utilised in large commercial buildings owing to its better resistance to corrosion, especially sulphates.

Dr. Chaturvedi said the cement industry can utilise flyash as an additive to the extent of 20 to 25 per cent. The reactivity of flyash with lime imparts a high pozzolanic activity to the cement, improving its strength to weight ratio and chemical resistance. Indian flyash, however, lacks the necessary lime reactivity level and good flow properties, and CPRI scientists are working on cost-effective methods of pelletisation to improve it for use in the cement industry.

Another promising method developed at CPRI is large-scale utilisation of flyash along with cement kiln dust residue to serve as an intermediate raw material for Portland cement. The manufacture of light weight aggregates from flyash provides a method for disposing of sizeable amounts by converting it into a very useful product with a variety of applications. One such product is flyash gravel which finds extensive use in the manufacture of prefab floor elements and for casting in situ. The technology for light weight aggregates is an attractive option as it can bring down the destruction of landscapes to meet the gravel demand.

High value utilisation of flyash is in mineral recovery, mineral wood production and ceramics. Analysis of Indian flyash reveals that aluminium and iron can be easily removed from it, avoiding disposal costs, generating revenue from metal and mineral sales and conserving mineral resources.

The mineral separation technique is called the direct acid leach (DAL) process. The flyash is leached by a three-stage counter current extraction procedure in the presence of boiling mineral acids like hydrochloric acid, which extract the metals out of the flyash into the solution. The leachate, rich in iron and aluminium, is passed through anion exchange columns, precipitated, leached, crystallised and calcined to recover alumina. The DAL process helps to recover more than half the alumina present in flyash, about 360 grams per kg. of flyash compared to 125 grams from one kilogram of bauxite.

A 600 MW power station can earn Rs. 50,000 per day by separating the magnetite in flyash and selling it. Flyash contains three to five per cent magnetite and an estimated one tonne can be recovered from the 128 million tonnes of flyash generated in India every year. Experts report that flyash magnetite is better than commercially available magnetite, and with further chemical processing, it can be used as iron ore in both blast and electric furnaces, as well as to manufacture ferro-silicon.

A very interesting byproduct of flyash is the hollow or solid microsphere called cenosphere. Almost 20 per cent of flyash is nothing but a glassy matrix of calcined clay in which the gases have had no opportunity to escape. These cenospheres average about half the diameter of the smallest glass beads produced commercially.

A small gas bubble at the centre gives them an average specific gravity of 2.3 grams per cubic centimeter, compared to 2.6 of the commercially produced cenospheres. These cenospheres are being increasingly used as fillers in composites and paints, fire probe cable tapes and fabrics, heat shield tiles, noise attenuation, fabrication of light refractories and refractory pouring basins.

-- P.T.I. Science Service, February 16-28, 1990

BIOPOLYMER ENGINEERING — GROWING PLASTICS

Scientists in the nascent field of biopolymer engineering are aiming to produce bacteria, and eventually food crops that are genetically tailored to yield a whole new breed of plastics, reports the journal "Science". In other words, researchers are now experimenting with ways to grow plastics instead of manufacturing them.

Already one chemical company is using vats of bacteria to produce a polymer than can be processed into a polypropylene-like plastic. And, several research teams are trying to modify the genetic structures of bacteria to create new products, including synthetic rubbers and unusual types of plastics. These biologically produced plastics, or biopolymers, are biodegradable and could eventually become a renewable source of plastics not dependent on petroleum. Although they are relatively expensive now, they have the potential of becoming cheaper than synthetic polymers.

The biopolymers promise to open up whole new areas of study in science. Scientists, using the natural enzymes at their disposal, can control the designing of strange new types of plastics, rubber-like substances and perhaps even some unknown materials. Interest in the field was ignited in 1988 when researchers at James Madison University in Virginia cloned polymer-making genes from a bacterium that naturally produces a plastic-like polymer. By then, Imperial Chemical Industries has established a pilot plant to grow vats of alcaligenes eutrophus, a bacterium that turns out a polymer called polyhydroxybutyrate (PHB).

A single molecule of PHB consists of thousands of hydroxybutyrate molecules linked end to end. PHB plays the same role in the bacterium as fat in humans or starch in plants. But in bulk, it is as stiff, brittle plastic that can be used to make soft drink bottles. A eutrophus manufactures PHB when grown in a glucose solution deprived of nitrogen. But it is not so simple to harvest the polymer from the bacteria. The PHB is stored inside the cell wall in the form of granules, each containing thousands of polymer chains.

So, to recover the polymer, the cell wall must be broken down, the PHB separated from the cell debris, all without damaging the granules, and finally process the polymer into a plastic. The last step is tricky as PHB's melting point (170°C) is nearly as high as the temperature at which it decomposes. To overcome this problem ICI grew the bacterium on a mixture of glucose and organic acids, which induces the bacterium to make a copolymer — a chain of two different types of molecules. In particular, the bateria add 5 to 20% hydroxyvalerate molecules into the chain of hydroxybutyrate molecules, and the resulting polymer, called PHB-V, is stronger, more flexible and has a lower melting point than PHB.

Research is underway on the next stage of biopolymer development: altering the bacteria's genetic structure to improve the production of the plastic and to make new kinds of polymers. Scientists have also succeeded in transfering the PHB gene from A.eutrophus into E. coli, a standard laboratory bacterium. Putting the PHB gene into large mutant E. Coli cells might produce a bacterium that makes ten times as much polymer per cent. Austrian scentists have inserted PHB genes into a strain of E. coli that bursts when heated to a certain temperature. In this way, they can avoid exposing the bacteria to a solvent or some other damaging treatment to release the polymer granules. But there are still a few problems. The genetically engineered E. coli produces lesser PHB compared to A. eutrophus.

Scientists at the University of Massachusetts meanwhile, are working on a bacterium that lives on hydrocarbon — octane, nonane and decane — and produces an elastic polymer similar to rubber. This biodegradable elastomer might be handy in graft of blood vessels, they say. Similarly, another bacterium Rhodospirillum rubrum uses energy from sunlight to produce a new class of polyesters. Bacteria can produce polymers faster, with higher molecular weight, purer and cheaper than can chemists. Scientists are dreaming of the day they can put genes for plastics production into food crops, a fact that may lead to raising polyesters alongside potatoes, science says.

-- P.T.I. Science Service
February 16-28, 1990

PAPRIN — AN EFFECTIVE PROTEIN-VITAMIN FODDER ADDITIVE

One and a half tonnes of poultry meat, almost a tonne of pork and 10,000-15,000 eggs can be additionally obtained without an increase in the expenditure of fodder. The secret is simple — a tonne of protein-vitamin concentrates (BVK- Russian abbreviation) produced under a technology developed by the National Resea[...] Institute of Protein Substances in [...] Soviet Union. These effective addit[...] include paprin (yeast grown on puri[...] petroleum paraffins). It enriches [...] mals' diet with protein and amino ac[...] especially lysine (a tonne of paprin c[...] tains not less than 45 kg. of lysine, [...] 50 per cent more than in soya oil ca[...] maize grain, wheat grain and oats gra[...] B group vitamins, micro and mac[...] elements.

The use of fodder balanced with p[...] teins makes it possible to reduce [...] amount of grain used for the outpu[...] livestock products by 30 per cent [...] increase the average daily we[...] growth of animals for fattening [...] 50-100 per cent. The introductior[...] paprin into the diets of valuable [...] bearing animals (minks, Arctic fo[...] and foxes) makes it possible to red[...] the cost of their feeding and does [...] reduce livestock yield indices. Papri[...] also successfully used in pond f[...] breeding when carps are bred.

This protein additive is harmless [...] has no teratogenic (tending to ca[...] developmental malformations and m[...] strosities) and mutagenic effects. T[...] was confirmed by tests on eight ge[...] rations of brood-sows. Studies by ra[...] isotopic and biochemical methods h[...] shown that hydrocarbons of BVK [...] oxidized in the tissues of animals up[...] ordinary metabolic products and that [...] chemical composition of meat does [...] change. Livestock products obtaine[...] the case of the inclusion of paprin i[...] the diet in no way differ from us[...] ones. Each year the Soviet Union p[...] duces 1,840,000 tonnes of microl[...] (yeast) fodder protein. The product[...] cost of a tonne of raw protein papri[...] comparable with the index for the sa[...] quantity of raw protein of soya oil ca[...] and is three times lower than the p[...] duction cost of protein of fish m[...] Paprin is stable during storage: its qu[...] ity is guaranteed for 18 months.

-- P.T.I. Science Servi[...]
February 16-28, 19[...]

TACKLING OIL SPILLAGE POLLUTION

As oil spillages from supertankers pose an increasing menace to the environment, the technology to deal with these dangerous oil slicks is forging ahead to rid the seas of the pollutants. One of the major difficulties encountered in cleaning up substantial oil spills is the large area that is affected, made all the more bigger by wind, tides and currents. However, if the oil can be confined to a relatively small area by means of containment booms, it may be possible to deal with it using various kinds of mechanical equipment.

There are two main types of boom in common use. One is the fence boom which has a rigid blade from top to bottom to provide both freeboard and draft. The other is the curtain boom which also has foam (and sometimes air) buoyancy, and an additional flexible skirt which can flex independently of the freeboard top section. Among the newer versions proposed recently in Britain are the very strong and puncture resistant ones with welded seams. Strength is very important as the loads imposed on a boom working in strong currents with wave action and a great deal of floating debris are considerable. One snag is that under certain conditions the boom will lean over despite the ballasting of the skirt.

It is an over simplification to assume that the deeper the skirt the more effective the boom, as it is known that the deeper the barrier the greater the water disturbance with greater loss of oil sucked beneath it. Various types of sophisticated booms are now being supplied by leading British companies, including specialised river, harbour and coastal booms, booms designed to protect the land/water interface and those for use in fast flow areas and low pour point oils.

One interesting idea that will be tried out in Nigeria soon is a boom made of three rows of used car tyres held together with chain tyres, which the manufacturers claim will be so low in cost that many could be located around high risk to make them available quickly in times of need. Once successfully contained, there are several approaches to deal with the oil. One is the weir skimmer that allows water and oil to flow over an adjustable weir before being separated. Unfortunately a lot of water is also received, and the debris tends to restrict performance.

Another method of scooping up the oil is to use rope mop skimmers. A rope, which is interwoven with long strands of polypropylene, forms a continuous loop. It passes over power rollers along the surface of the water, around a pulley and then goes back to the rollers, where the collected oil is squeezed out. One major advantage with this device is that it prefers to pick up oil rather than water and typical rates of oil recovery from the various machines on the British market are between one and seven tonnes per hour. But the weak points are many. The high capital cost, necessary rope replacement, the difficulty in fixing the pulley in the best place, and the fact that presence of any oil dispersant will seriously affect performance.

A further alternative to recover floating oil is the disc skimmer which has banks of rotating discs on drive shafts. In use, one-third of each disc is immersed. As the discs rotate through immersed water the oil adheres to them on the downward movement and is then scraped off and transferred to collection troughs on the upward movement. However, the machine is very costly.

Recent research on the T-disc shows that oil recovery depends on the thickness of the film, the depth of immersion and the rotational speed of the disc. T-shaped discs pick up oil better than plain flat ones, but these discs should not be too close together, or it will affect their performance.

The special absorbents which are used to soak up relatively small amount of oil and are made of vegetable matter or synthetic polymeric material, come in the form of sheets, rolls, pillows and circular booms. If left in water for too long, they often break up and sink. A device rather like a parachute, is another idea being proposed to contain large areas of oil. The method involves dropping a large synthetic "parachute" over the oil with the crown buoyed up.

The whole apparatus, including the oil that it covers, can be towed ashore where the oil is burned. However, since it is not always easy to burn oil, there are vacuum devices suitable for use on emulsions. Dispersants used to break down oils can be applied either from the air or from vessels equipped with spray arms and now come in more sophisticated forms. While one London-based firm now supplies a shipborne spray system that allows a greater area to be treated than with conventional gear, another British firm supplies equipment which can spray 40 to 50 litres a minute of neat concentrate dispersant chemical, through spray arms deployed on both arms of a seagoing vessel.

Each spray arm is eight metres long and has five nozzles, and an electrically driven pump with a flow meter and other devices ensure that precisely the right amount of dispersant is released to break up the oil. There have been other breakthroughs to deal with special situations. For example, anchor pillars are available for use in where there are changes in water level. These slotted pillars allow the boom to adjust its level automatically. There are special reel units for the boom, rising and sinking booms that allow vessels to pass over them, boom fair leads which line up the boom as it enters the reel to prevent scuffing and the magnetic connectors that make an efficient seal for booms against a ship's side.

-- **P.T.I. Science Service, February 1-15, 1990**

Chemical Project Appraisal by Financing Institutions

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One of the main reasons attributed to project delays in India s the time consuming procedures adopted by the central and tate financing institutions in appraising the projects and sanc-ioning the financial assistance. There are a number of cases, vhere the financing institutions have taken as much as 12 nonths in appraising and clearing the projects, even in the ase of medium scale industries. On the part of the financ-ng institutions, it is said that such delays are unavoidable ue to the extensive investigations that are required before learing the projects. One feels that scope certainly exists to mplify and rationalise the procedures for appraisal and cut own the time required for the investigation of the projects y the institutions. This is particularly so in the case of the hemical projects.

In the appraisal of the chemical projects, the institutions ten get themselves bogged down in the assessment of emand potentials for the products and estimation of gap in e supply situation in the coming years. They often insist at the project promoters should produce firm tie up letters om the prospective buyers to establish the demand levels r the products. Many promoters manage to produce such tters from the possible users to satisfy the financing insti-tions, though it may have no guarantee of sale of products, the time the project would be completed. One wonders to whether such extensive market survey efforts are quired at all, in a country like ours, where the present per pita production and consumption levels of almost all the emical products are far less than the advanced countries d there is an urgent need to promote the exports of fin-ed products. In a situation, where the growth of one indus- leads to the growth of many other industries and the nand for the products go up only when they are adequately ailable in the market, stifling the growth of industries in name of market constraints, especially in a developing ntry like ours, can only become counter productive. What equired to be judged during the market survey is only the evance of the product for the country's industrial and eco-mic growth pattern.

Both the financing institutions and the chemical project moters appear to be obsessed only with the Indian market, ere the purchasing power of the consumers are poor. There o attempt to assess the export potentials of the products matter of routine, from the point of view of the raw mater-availability, product quality, cost of production and inter-ional supply situation. By looking only into the Indian rket demand, the institutions tend to put a break on the growth of chemical projects in the immediate future. For example, the present Indian production of titanium dioxide pigment is less than 20,000 tonnes per annum, constituting less than 0.5% of the total annual world production level of around 2.7 million tonnes. But, India possesses around 14% of the total world reserves of ilmenite, which is the raw material for the manufacture of titanium dioxide.

Even in the case of such an important project, there appears to be prolonged considerations as to what extent the further capacity should be created in the country for the production of anatase and rutile grade titanium dioxide per annum. It is often argued that there would be no export potentials for most of the Indian chemical products, due to the high cost of the operating structure in India. But, certainly a dual pricing system can be considered, where different price levels can be fixed for the indigenous and export markets, that would protect the profitability of the industry.

The financial institutions are in a position to develop and encourage such export culture amongst the industries, by necessarily considering the export potentials of the products with due reference to the economy of the industry, during the project appraisal stage itself. The mere assessment of the demand potentials in Indian market before sanctioning financial assistance appear to have become a counter productive appraisal procedure and a waste of time. This has also become a very time consuming exercise, due to the non-availability of the organised information readily in the country.

The financing institutions should try to play a greater role in ensuring that adequate, optimum and appropriate technology is adopted in the chemical projects. The chemical technology scenario is rapidly changing all over the world and the obsolescence of technology has become a frequent affair. In the protected Indian economy, the obsolescence of the technology also appears to be protected by the government policies. There appears to be a tendency on the part of the Indian project promoters to import technology from abroad, even when the appropriateness of the technology with regard to the present Indian conditions are doubtful. They appear to be guided only by the prevailing Indian sale price for the products and the profit margins in deciding the technology. Computerisation of the plant processes, at the cost of employment potentials are not necessary in many cases. A number of cases can be cited, where the technology adopted in the advanced countries to meet their requirements of the raw material availability and cost factors are simply brought

into India, in the name of foreign technology, without adequately analysing the Indian relevance. The financing institutions restrict themselves to look into the raw material and utility consumption norms, proven nature of the technical know-how and assess the profitability potentials based on the Indian cost and price factors. They do not appear to pay attention to the factors of technology relevance at all.

Though the technology scenario in the chemical industries have been undergoing rapid changes and improvements almost on a continuing basis, there is no indication that the financing institutions have taken any special steps to keep themselves appraised of such changes. Similar is the case with regard to the demand potentials, and supply situation for the chemicals in the country and abroad. The state financing institutions even appear to be less equipped with data and informations, as compared to the central institutions. Perhaps, the institutions do not find it possible to keep such updated informations, though they may appreciate the need to do so. Under the circumstances, the best course of action for the institutions would be to utilise the services of the consultancy organisations in a big way, to provide them with the data and informations on a continuing basis.

Though the financing institutions and some of the banks like State Bank of India maintain a panel of consultants, there appear to be no organised and methodical way in utilisi the services of such consultants. It is clearly said by the institutions that the utilisation of the services of the consu tants is not mandatory, while appraising the projects. The are a number of cases, where chemical project proposals a investigated by the financing institutions, without t involvement of specialist agencies at all. This often leads wrong decisions, particularly with regard to the decisions technology and nature of demand for the products.

It is high time that the financing institutions make indepth appraisal of the procedures adopted by them f appraising the chemical projects. The routine methods assessing the gap in supply of chemical products should replaced by providing guidelines to assess the relevance the products to the growing economy. Technology should n be evaluated on the basis of profit potentials, which is real more dependant on the prevailing sale price of the produc rather than the quality levels of the technology.

The employment potentials of the products should not overlooked for the sake of modernisation and computeris tion, while clearing the projects. The financing institutio have a key role to play in directing the growth pattern chemical industries and they should not end up as me money suppliers for the chemical projects in the countr

Problems of the pesticide formulation industry

PRADEEP P. DAVE
Managing Director, AIMCO Pesticides Limited.

r Indian economy, as everybody knows, agriculture ays plays a very important role. One erratic monsoon is icient to change the entire economy of the country for year. Our farm economy involves a total budget outlay Rs. 21,000 crores, utilised for five major inputs viz. power, o-engineering, seeds, fertilisers and pesticides, with power suming almost 60% of the total outlay, seeds around 2%, ilisers 32%, agro-engineering 3% and pesticides 3%. ein lies the crux of the problem. Out of a total outlay of 21,000 crores pesticides contributes 3% equivalent to roximately Rs. 630 to 650 crores. Again the consump- of pesticides always depends on good monsoon and ourable agro-climatic conditions all over the country. The re of the industry thus lies under the benevalent mercy ature and rain god.

we look at the sequence of farm puchases the following bvious: farmers buy seeds then fertilisers and from the over and if essential, they tend to buy pesticides. How- , this is subject to better monsoon and uniform rainfall ting in good crop condition and then only he thinks of ng pesticides provided there is a pest attack. In India ers are using pesticides for controlling and eradication sts rather than as a preventive measure. All these years rnment has given a lot of importance to fertilisers, seeds gro-engineering, neglecting a very important input: pes- s. Our foodgrain production forecasted for 89-90 is d 175 million tonnes, out of which 15 to 35% is yed by a growing number of insects and pests account- r a loss of about Rs. 7,000 crores.

s of industry

: total market of technical pesticides and formulations -90 in terms of rupees is approximately Rs. 650 crores ing pesticides used in public health. From this total t herbicides must be approximately 10 to 13%, the rest insecticides and fungicides, which is a major contrib- 'otal installed capacity for insecticides and fungicides 39 was approximately 95,000 MT, demand forecasted proximately 65,000 MT and production estimated was MT. In 89-90 total installed capacity reached 1,10,000 th demand forecast of around 65,000 MT and esti- production around 60,000 MT. The shortfall in pro- is met by import and demands are always on higher he difference between installed capacity and actual ion is very large, which initiate and compel technical grade manufacturers to price their technicals in such a way that the entire cost of investment, cost of production and profitability are based on installed capacity resulting in the high price of technical grade pesticides actually produced. Total number of technical grade pesticide manufacturers in the large scale sector is approximately 62 to 65 and formulators in small and medium scale around 525, out of which 350 must be in actual production. Total market share of technical grade manufacturers in pesticide formulations is around 60%, 20% by pesticide formulators non-associate, 15% by government and balance by small retailers/distributors.

Total size of the industry is Rs. 650 crores having 65 basic technical grade manufacturers, out of which 70% are multinationals and balance Indian large industries. Added to the same there are pesticide formulators numbering 510 and further added to this there are agroindustries and marketing federations of states. All these results in a complicated situation with serious problems in the entire industry.

The government has neglected planning of this industry as family planning is neglected. Due to lack of family planning there is not enough food. Likewise excess installed capacity which the government has allowed in technical grade pesticide and formulations resulted in a fight for survival for each and every formulator. The excess installed capacity has resulted in unhealthy competition in the market and sometime pesticide formulations are sold below the cost of production, because of which the entire pesticide formulation industry is sick.

Reasons for plight of industry

High price of technical grade pesticides to non-associate formulators by technical grade manufacturers

Pesticide formulators are always pressed from both sides — first by the technical grade pesticide manufacturers and second by their customers (dealers/distributors) as there is no price control for technical grade pesticides. The prices charged by the basic manufacturers tend to be unreasonable. As they are supposed to give 50 per cent production to non-associate formulators and balance 50 per cent for their captive consumption for the production of pesticide formulation for which they control 60 per cent market, they would like to have profit at both ends. First of all the price of technical grade pesticide is based in such a way that the estimated profit from the sale of their formulations are always burdened in the price of technical grade pesticides resulting in formulators paying a very high price for technical grade pesticides. In turn cost of formulation manufactured by non-associate

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a paper presented at I.I.M., Ahmedabad, on the occassion of a Workshop on Agricultural Input Marketing — Feb. 15 & 16 1990.

members is always higher. This gives scope for technical grade manufacturers, who also control 60 per cent of formulation market in the country, to realise a high price for their formulations. Non-associate formulators cannot compete with them because of high price of technical grade pesticides.

In a similar way formulators are not getting better treatment from the dealers/distributors as they pay 15% to 20% lower price to the formulators compared to the brand dealer who is always a multinational. There is no difference in the quality, packing and credit offered by both sections of the industry to the customers.

Non-availability of technical grade pesticides and increase in the price during the season for non-associate formulators

The price of technical grade pesticides is not at all stable. Every two to four months there is an increase in the price by basic manufacturers, the first increase usually coming between January and March before the budget and import policy, and the second increase in the peak season which starts between June and August. The tricks are played very intelligently, first increase before budget and import policy always does not come to the notice of the government, second increase after the budget and import policy to justify increase on account of hike in various taxes such as excise, sales tax, customs duty, etc. and third increase on account of increase in the cost of production due to labour, etc. which is supposed to be genuine.

All these increases in the rates only applies to technical grade pesticides manufactured by basic manufacturers, but it does not apply to the formulations marketed by them, which they manufactured out of 50% captive consumption of technical grade pesticides. During the season they increase the price of technical grade pesticides to confuse the formulators and formulators also increase the price of their formulations because of increase in the price of inputs, which results in loss because basic manufacturers will not increase the price of their formulations till they finish their stocks and they position their materials on the dealers/distributors counters first so as to get their material sold on first round of purchase by the farmers.

By the time SSI formulators put up their products in the market they are too late and then chain of problems start for liquidity of the products and recovery as dealers/distributors always prefer to pay first the brand dealer (multinational and large scale) and then if he feels he will pay to the small formulators if at all he is in a mood to pay to them in time. In case of failure of the season, small formulators will have to take back their materials from the dealers/distributors' counters and suffer a loss. This is a very important factor, which always confuses small formulators. All basic manufacturers are playing this type of trick all over the country and tal advantage accordingly. Prices are increased right in mi of the season.

Working capital finance

The credit period allowed to the customers in privat 45 to 90 days and in government 90 to 180 days, whic depending upon the product, company and the area w the sale is effected. Similarly, huge inventories of raw ma ials and packing materials are kept for minimum 1 to 1 months consumption by the formulators and finished p ducts for 15 days to 1 month sales. This results in short of finance especially cash flow to the formulators. Adde the same, RBI has allowed credit period of only 15 day the pesticide industry. Further, a ban imposed by the g emment for the creation of new capacity has been mis and misinterpreted by the commercial banks resultin infringement in the finance to the pesticide formulators. ticides Formulators Association of India (SSI) are repeat getting complaints from their members all over the cou for the refusal of the finance by the banks because of w interpretation of RBI circular.

The RBI circular says 'new capacity' which means manufacturing unit — whereas banks have included the e ing units also and they have stopped processing applicat for enhancement in the limit to the SSI units. As you kn in every two to three years new pesticides are introduce the country. Similarly, new licences are issued which invo further requirement of finance by the existing units and I the government should inform the RBI and commercial b to release the finance to the existing units for their var requirement of the finance for the introduction of new ducts in the existing manufacturing capacity. Unless and finances is provided adequately to the existing units the capacity in the SSI units, which is almost 60 to 70%, not be utilised fruitfully. The shortage of the finance i main reason for the creation of idle capacity and if the emment provides sufficient finance further 30 to installed capacity will be utilised, which will bring dow price of pesticide formulations for the benefit of the farm

Pesticide market and consumption

Total market of pesticide is approximately Rs. 650 cr in 89-90. The use of pesticide is of seasonal nature. T are two seasons viz. kharif and rabi. The consumption of ticides is concentrated in areas where there is lift irrig and canal. As per the statistics 60% farming depends or which results in uncertainty in the demand of pesticides. June to October consumption of pesticide formulation very high. As this is a seasonal business, formulators are posed to keep inventory of finished products for two mo sale in advance before the commencement of season a by bad luck monsoon fails, then sales nosedive and if i

s good monsoon and healthy crop without any pest and insect ttack then also sales drops. If availability of seeds are in hort supply at the time of sowing or not upto the standard, here will be failure in the crop as well as loss in sales of pesticide formulations.

Pesticide formulators are always at the mercy of — first basic manufacturers because they will sell technical grade pesticides well in advance before the commencement of monsoon on cash and carry basis against Bank Guarantee or L/C, so their risks are covered, secondly monsoon which plays a key role and thirdly favourable agro-climatic condition which also includes little pest attack. If all these factors are in favour then only formulators can market their products successfully.

As everybody knows, last year — October and November season of Andhra Pradesh liquid pesticides failed miserably due to healthy crop without any pest attack and entire pesticide industry was burdened with heavy inventory of finished products.

Consumption of pesticide formulations also varies. Farmers, who grows cash crop like cotton, groundnuts, sugarcane nd tobacco, are using pesticides heavily like any other farmers in the world. But to predict or forecast the pesticide market is very very difficult and it is as reliable as a weather report. When you go with umbrella there will not be any rain. Similar is the case with pesticide market.

Keeping in view the shortages of formulations in 88-89 pesticide industry did good homework for 89-90, but due to the failure of the season all are carrying heavy inventory of finished products and raw materials. To market pesticide formulation sometime is as good as playing blind.

IB registration formalities under the Insecticides Act & ules 1963

If you destroy a free market, you create a black market nd if you have ten thousand regulations, you destroy all spect for the law. The Insecticide Act was introduced in 968 for the benefit of farmers and citizen of India. The me is concerned with the quality, toxicity, bio-efficiency, fe handling and other scientific parameters. The industry s whole-heartedly welcomed the above Act, but in the process of time Central Insecticides Board has amended the Act thout consultation of the industry, stifling the growth of e entire pesticide industry. Every year CIB wants to amend Act, resulting in making registration formalities very mplicated and time consuming. We understand now they nt to amend Section 9 (3), which relates to the registration.

At present final registrations are granted under Section 9 and on the basis of Section 9 (3) repeated registrations are allowed to any manufacturer without generating the data under Section 9 (4). Due to the pressure and many representations from basic manufacturers CIB wants to amend Section 9 (3) and they want to give five years protected registration and if the same is implemented there will be no registration available under Section 9 (4) for next five years, which will result in exploitation of the market by basic manufacturers and entire pesticide formulation industry will be killed if government fails to stop the said amendment.

The first registrant will manufacture and market the product alone without any fair competition from other sections of the industry. As you know, in 1979-82 there was lot of confusion in the registration formalities and section 9 (4) was not in operation due to which many multinationals and large industries introduced fenvalerate 20% EC and cypermethrin 25% EC and same was sold to Indian farmers at a very high price of Rs. 500 to 600 per litre and Rs. 600 to 800 per litre respectively. Due to various representation by PFAI (SSI) repeat registration was introduced under Section 9 (4), which allowed 20 new pesticide formulators (SSI units) to manufacture the above products. Today the same products — fenvalerate 20% EC and cypermethrin 25% EC — are available at Rs. 180 and Rs. 350 per litre respectively.

For the last five years cost of input, packing material and labour have increased, but the cost of finished product has nosedived from Rs. 600 to Rs. 180 for fenvalerate and from Rs. 800 to 350 for cypermethrin. This is an interesting example for BICP, Ministry of Chemicals and Petrochemicals and for Ministry of Agriculture (Users' ministry). They should study the same and must understand the trick of the trade. All these years farmers are robbed due to protected registration to the first registrant and also due to late issue of registration to the SSI. Many companies who went into the production of synthetic pyrethroids in the earlier year made good fortune and their balance sheets have shown a very fat net profit.

I feel CIB registration procedure should be modified and simplified. Due to the delay in registration farmers are paying very high cost for the new pesticide as well as crores of rupees are lost in export business. For export registration CIB should simplify the procedure and they should not ask data on toxicity and bioefficacy. In 20th Century when orders are communicated on fax and L/Cs are transmitted on fax where is the time to apply for registration for export? Leave aside export, even quick registration in small scale sector will result in a fair competition and will get the price line checked. I have already given the examples of pyrethroids.

Laws are like cobwebs. If a trifling or powerless thing fell into them they hold it fast. While if it is something weightier it breaks through them and is off.

Conclusion

I am very grateful to I.I.M., Ahmedabad, for giving me an opportunity to put forward problems of Pesticide Formulators in India especially in SSI sector, which is functioning very badly since its inception because (1) they do not get technical grade pesticides at right price, (2) prices of technical grade pesticides are not stable and also supplies are not in time and (3) CIB registration formalities — which are time consuming and restricting them to introduce new products to meet market demand and also compete with large units. If Section 9 (4) registration formalities are simplified and all the products registered under Section 9 (3) are allowed for registration under Section 9 (4), I feel pesticide formulation industry will grow fast.

I feel there is no need for basic manufacturers to go into formulation business, which they do from their 50% captive consumption. The government must stop this and try to lise the ideal capacity of pesticide formulations, which sho be restricted to make high tech product and introduce n pesticides in the country and they should be allowed to all the cost in the profit for the introduction of new produ while pricing technical grade pesticides. This will result a healthy situation for basic manufacturers as well as for f mulators. No new licence should be given for formulat even if a new unit is making technical grade pesticides

I strongly suggest that the government should set up a Mo itoring Committee consisting of basic manufacturers, PF users of technical grade materials, BICP and Ministry Agriculture to review and monitor the availability of tec nical grade materials and price structure for technicals as w as for formulations. This will perhaps bring a closer und standing between various segments of the pesticide indust

Chemical News From Abroad

ROCHE BID MAY BOOST WEAK BIOTECH SECTOR

Hoffmann-La Roche startled market watchers on both sides of the Atlantic with the announcement that it plans to take a 60 per cent stake in US biotechnology giant Genentech. This brings to an abrupt end the ambition of Genentech's founders to develop the firm into a fully fledged stand-alone pharmaceuticals concern.

The deal certainly caught most industry watchers off-guard. Roche, the world's 14th largest-drugs operator, has tried to build up its US presence for some time but most analysts were expecting a move into the US over-the-counter market. Indeed, Roche made a $ 4.7bn bid for Sterling Drug two years ago but was pipped to the post by Eastman Kodak.

Under the terms of the deal, described in many quarters as pioneering, Roche will invest some $ 492m in capital and will spend $ 1.6bn buying half Genentech's outstanding stock for $ 36/share — a 65 per cent premium on the share price at the time of the announcement.

Surprisingly, Roche is entering the deal with a hands-off commitment. Commenting on the move, Roche chairman and ceo said: "Roche's $ 2.1bn total investment will be best served if Genetech continues to operate in the manner that led to its impressive success in such a short time.

"We are committed to Genentech proceeding with its business and maintaining its enterprising spirit with autonomy. Both companies will retain independent control of their research agendas and continue their existing business relationships with other pharmaceutical and biotechnology firms."

Genentech, it seems, had been searching some time for a owhite knight to help finance the costly development of biotechnology-derived drugs. "Long term commitment to medical research is often at odds with today's short term investment focus," explained Genentech founder Robert Swanson.

Genentech has just completed its most successful year with $ 400m in revenues, but its extensive research programme consumes 40 per cent of that total. Despite the high earnings multiple (estimated to be 100 times), financial analysts have applauded the move.

Denise Gilbert, San Francisco-based analyst with Montgomery Securities, describes the deal as "one of a kind", which will benefit both firms. But she is keen to point out that full ownersh would inhibit Genentech's progress.

The prospects for the rest of the bi technology industry are drawing mixe projections. Gilbert does not believe th deal will open the floodgates for mo acquisitions of biotechnology compa nies by drug firms.

Gilbert said that the only other sim ilar target would be Amgen whic although profitable does not have a R & D pipeline as strong as Genentec and is facing legal problems. She rule out other highly rated companies suc as Chiron which have collaborativ agreements with a number of differe firms.

Roger Shamel of Consulting Resou ces, however, believes the deal signa the "opening bell for more mergers ar acquisitions". He believes the top ti of US biotech companies includin Amgen, Cetus, Biogen and Geneti Institute are all potential targets.

Echoing this view, Karl Simpson o consultant Benezech Simpson, claim the Genentech/Roche deal "marks a entry into respectability for biotechno ogy." He reckons the Roche mov could force other drug companies t move for biotechnology firms with th possibility of Celltech's fate bein sealed within the matter of weeks.

Genentech product development pipeline

Drug	Indication	Preclinical studies	Clinical trials	Filed for approval
Activase	Pulmonary embolism			●
	Unstable angina	●		
	Stroke		●	
Argatroban	Deep venous thrombosis		●	
Soluble CD4	Aids		●	
Hybrid CD4-IgG	Aids		●	
Gamma interferon	Chronic granulomatous disease			●
	Cancer		●	
	Trauma-related infections		●	
Growth hormone	Chronic renal failure		●	
Insulin-like growth factor	Tissue growth		●	
Lung surfactant	Infant respiratory distress syndrome	●		
Relaxin	Childbirth	●		
TGF-beta	Wound healing	●		
Tissue factor	Haemophilia	●		
Tumour necrosis factor	Cancer		●	

DU PONT CUTS POLYMERS COSTS

In a move to become "the world' leading and most profitable supplier c mid-to-high performance polymers an polymer based products," Du Pont is t embark on a restructuring of its polyme products business which will cut expen ses by $ 100m a year.

Through this rationalization, unde performing new ventures will b dropped and small poduct lines sold c operated through joint ventures, elimi nating around 900 jobs worldwide

About two-thirds of the job cuts will take place in the US, with more than half of those expected in the Wilmington, Delaware region.

Restructuring plans will also include the shifting of resources to improve productivity and reduce costs in order to focus on products, markets and technologies where its polymers businesses are strongest. The company did not specify which product lines were to be sold or discontinued but said decisions would be made soon.

"Businesses are to be streamlined through the elimination of management layers and by broadening responsibilities, through which we hope employees will be able to respond more quickly to the changing environment," explained a company spokesman.

The polymers products businesses are part of Du Pont's polymers business segment which earned $ 455m in 1989 compared with $ 531m in1988. The division includes engineering polymers, elastomers, fluoropolymers, ethylene polymers and performance films, and has sales of $ 3.29bn in 1988.

Meanwhile, analysts are praising the move and say that it is part of the company's move to gain a tighter grip on cost control. Other observers say this process is totally expected as the decision has been an under-performing area for sometime.

ENGELHARD PLANS STREAMLINING

Engelhard Corp. is to streamline its business in a major restructuring programme through which it will emerge as a chemicals and catalyst company rather than a precious metals groups.

The company has taken a $ 160.4m after-tax charge against 1989 fourth quarter earnings to cover the actions. This non-recurring charge consists of $ 110m relted to existing businesses and $ 50.4m to restructure on operations.

A spokesman confirmed the group's plans to concentrate on catalysts, pigments and additives, platinum group metal products and metal management services. He confirmed that it is currently looking for buyers for its remaining metal activities.

DEGUSSA SETS UP FUND FOR EAST GERMAN PROJECTS

In the wake of the opening up of the East German market, West German precious metals and chemicals group Degussa has announced plans to establish a DM1m ($ 600,000) fund too support projects with companies in East Germanuy. Hermann Strenger, the chairman of the West German chemical industry association, announced that the VCI was studying the range of possibilities for co-operation between companies in East and West Germany.

Most of the money in the Degussa fund will be spent on schemes to train employees of East German companies at Degussa plants in West Germany, but it will also support contact offices to be set up in East Berlin and Dresden. In addition, it will provide expenses for recently retired Degussa executives, who will serve as advisors to potential partners, mostly on an honorary basis.

According to Degussa, possibilities for cooperation with East German partners range from cooperative agreements on sales or technology to joint ventures. The cooperation would involve not only products but services, said a spokesperson. Services to firms in the East could also included help with environmental protection problems "wherever this is necessary", he said.

The Frankfurt group has confirmed it is "already in contact" with companies in East Germany, but that no agreements have been signed as yet. Projects could involve any of Degussa's areas of activity from chemicals production to metals processing, the company said.

Meanwhile, Solvay's chairman Baron Daniel Janssen said the company is currently its negotiations over two possible joint ventures with East European countries. It is understood to be prepared to reinvest in its former soda ash plant in Bernburg, which was seized after the second world war, in order to modernize it. However, a prerequisite would be that Solvay held 51 per cent of the venture. The soda ash plant was Solvay's largest pre-war facility.

In return, East German companies are planning to forge closer links with West European companies when EC trade barriers are lowered after 1992, said Christian Meyer, East Germany's deputy minister for foreign trade at an address at the Confederation of British Industry. The address marked the beginning of a five-day trip by 20 East German business leaders to visit around 50 companies in the UK.

Under discussion will be possible joint ventures and commercial transactions with companies such as ICI, Royal Dutch/Shell, Glaxo and SmithKine Beecham.

GARDINI REJECTS ENIMONT SALE

Montedison's 40 per cent stake in Enimont is not for sale. This was confirmed by its directors headed by Gardini during a meeting called to redefine the company's industrial strategies in relation to the Enimont situtation. The announcement follows suggestions that Montedison may be willing to redesign the foundations of Enimont. Furthermore, the Montedison board reiterated the company's commitment to the chemical sector and said it has formulated a development plan to be presented to the government, trade unions and other interested parties.

In addition, Montesidon said it is ready to negotiate with the government

over the future control of Enimont provided the "negotiators have the necessary powers".

Meanwhile, Montedison also agreed to postpone the syndicated shareholders meeting which was also arranged for 5 February in order to discuss Enimont's strategy. This meeting will however, take place before the Enimont shareholders meeting planned for 27 and 28 February. During the 27 February meeting holders will be asked to appoint two minority representatives to the Enimont board to reflect the 20 per cent of the venture traded on the market.

However, sources say that despite Gardini's assurance that it is determined not to sell its 40 per cent stake in Enimont, they believe that Gardini would still be happy to leave before the venture turns firmly downwards. Furthermore, if Montedison is keeping hold of its 40 per cent market, observers say it is difficlut to recognise what solution negotiations may achieve.

EC AGREES ON OPEN ENERGY MARKET

The European Commission's Economic and Social Committee (ESC) has adopted four opinions on the implementation of a single market in the European energy sector. It approved draft directives on international transit of electricity and natural gas through large networks, but has reserved the right to decide later on third party access to these distribution networks (common carriage), following the results of a Commission cost-benefit analysis.

On the question of transparency of electricity pricing, the ESC approved in principle the proposed directive, subject to transparency not being extended to cost structures, price formation and rates. The ESC was less happy at approving the fourth proposed directive, covering notification of capital investments in the petroleum, natural gas and electricity sectors.

It said it approved of closer cooperation between member states but found that disclosure of information at the feasibility stage to be premature, for reasons of confidentiality and competitiveness. It suggested a suitable point would be when a proposal was placed before a competent authority for approval.

Speaking before the committee in Brussels on 31 January, Antonio Cardoso 3 Cunha, the EC energy minister behind the directives, said "Energy (deregulation) is a political and not a technical problem. If necessary, the Commission is prepared to resort to legal action to ensure that the measures needed in the energy sector are properly implemented". Cardoso concluded by asking the ESC not to attempt to curtail the binding powers which the Commission wished to bestow on proposals.

BAYER UPS SPENDING

Bayer has confirmed plans to spend a record DM3.5bn ($2.1bn) on tangible capital assets in 1990 up from DM3.3bn in 1989. In the same period, the group will spend DM2.9bn on research and development.

Speaking in Stockholm, where Bayer's shares were launched at the beginning of February, chairman Hermann Strenger said his company sees "particularly great innovative potential" for its speciality polymers business, information systems, nutrition and health products. He singled out Bayer's pharmaceutical business for special mention, saying, "if we figure even conservatively we can expect sales growth of DM3bn from new drugs alone during the 1990s."

Strenger pointed to growth potential for polymers totalling "several billion Deutschemarks" over the next decade. He added that Bayer also expects "continued positive development" for its "established" products.

BUY-OUT TEAM DETAILS UNIROYAL GROWTH PLANS

Uniroyal Chemical, has US speciality chemicals management buyout, is o course to meet its growth projections President and ceo Robert J Mazaik revealed plans to expand current ope rations through acquisition and expan sion. Discussions are underwa concerning three US and two Wes European acquisitions.

"Our strategy from the start has been one of growth' both internally and through modest acquisitions", says Mazaika. He intends this growth to be in the firm's three business areas: speciality polymers, agrochemicals and rubber chemicals. "We are negotiating three acquisitions in the US which will add to our existing business", says Mazaika. He estimates these purchases will carry $10-20m price tags and expects them to be completed by the third quarter.

Similarly, Mazaika hopes to add a couple of West European businesses to the portfolio. "We are in preliminary discussions for a company in speciality polymers and are looking for synergistic opportunities in rubber specialities". Mazaika expects these buys will cost $5-10m each. Eastern Europe and the Far East are also targeting for expansion. The firm has been building up its presence in the Far East with joint ventures in South Korea and has another joint venture in the region on the cards.

Mazaika believes the changes in Eastern Europe will bring forward opportunities to increase the company's sales from the current $40m/year. "We are looking at the potential of building plants there, particularly for EPDM and specialities but these are still several years away".

Walter Cook, Uniroyal's vice president and general manager chemicals and polymers worldwide, revealed some of

he projected growth will come from iew capacity. The company expects to iave an EPDM plant at Geismar, Louisiana, on stream this time next year, and will build another through its Indian joint venture with Herdillia Unimers. "We are also evaluating facilities to make the crop protection chemical Omite in Brazil".

Mazaika stresses projected growth plans are not just for growth's sake. He intends to push Uniroyal into the top 10 per cent of speciality chemicals firms in terms of operating profits versus sales and return on investment. "At the moment we are in the top 25 per cent". Uniroyal posted sales of $805m in fiscal 1989 and Mazaika expects this to increase by more than 10 per cent.

MTM MOVES IN ON CHEMOXY

MTM, the UK speciality chemicals manufacturer, has launched a hostile bid for smaller rival Chemoxy International, valuing the company at over £12m $20m). Although Chemoxy has described the 400p/share offer as inadequate and advised its shareholders against acceptance, MTM chairman Richard Lines is confident sufficient shareholder acceptance will be obtained.

The bid represents a premium of 50 er cent over the current market price f Chemoxy's shares. "It is a full, reaonable offer and we are not in a posion to improve it", Lines said. However, industry observers suggest val bids may be in the offing and ITM may need to sweeten its offer. On a cash flow multiple basis, it is a retty full offer with limited scope for nprovement", said chemicals analyst r. Charles Lambert at Smith New ourt.

The two companies entered into dissions in late December 1989 in an empt to come to an agreed offer but ese discussions ended in January after agreement was reached. Speculation is causing Chemoxy's share price to move against the market, said Lines, and MTM decided to end discussions and make an open offer. Chemoxy, which reported a turnover of £11.5m and pretax profits of £1.06m in the year ended 31 March 1989, is engaged in the manufacture and distillation of organic chemicals and also produces its own range of speciality, performance and effect chemicals. Chemoxy products find application in oil exploration and the manufacture of detergents, fragrances, paints and pharmaceuticals.

MTM, which is tending to be fairly short of production capacity, regards Chemoxy as a good strategic fit. Currently capitalised at £106m, MTM manufactures and distributes high-value fine chemicals for the pharmaceutical, agrochemical and speciality chemical markets and supplies services to the chemical industry. MTM has two alternatives, said Lines: either to buy Chemoxy and integrate and upgrade its capacity at its Teesside site or else to build its own capacity at Teesside or elsewhere which would create "rather a heavy competitor" for Chemoxy. Lines wants to take on the Chemoxy business and expand it, predicting employment in the company will rise sharply over the next few years.

DEGUSSA INCREASES HYDROGEN PEROXIDE PRODUCTION

Degussa AG, of Frankfurt am Main, is to increase its annual production capacity for hydrogen peroxide by some 72,000 tons. The company has already started work on the extra production facilities. This increase in capacity will be evenly spread between the Group's two largest foreign production sites, at Degussa Antwerpen N.V., Belgium, and the Deugssa Corporation's plant in Mobile, in the US state of Alabama. The plants are expected to be in operation by the end of 1991. The investment costs, totalling around 150 million DM, include the construction costs for a sodium perborate monohydrate production plant at Degussa Antwerpen N.V. It already has facilities for producing sodium perborate tetrahydrate which, like the monohydrate, is used as a bleaching and oxidation agent in detergents and cleaning agents.

The largest customer of hydrogen peroxide is the cellulose-processing industry (textiles and paper), in which the product is used as an environmentally acceptable bleach. In addition, it is used as an intermediate product for synthesising processes in the chemical industry, acts as a base material for the manufacture of detergent components and is increasingly used for environmental purposes, e.g. for removing toxic substances or those with an objectionable odour from effluent. Degussa manufactures hydrogen peroxide in Rheinfelden (Germany), Weissenstein (Austria), Antwerp (Belgium) and Mobile (USA).

BTG GOES PUBLIC

After another record breaking year in 1989 — with profits up 22% — BTG, currently part of the Swedish Bonnier Group, is planning to go public during the coming months. BTG with an international sales and marketing network as well as modern manufacturing facilities in the USA, Sweden, Germany and Switzerland, is well prepared to take on this new phase in the company's successful history.

The annnouncement from BTG's headquarters in Switzerland does not come as a surprise. In its endeavour to expand and with the rapid growth the company achieved over the years, BTG is going public to actualise a solid industrial structure for the future. The company has specialised, among other fields, in in-line/on site measurement of concentration, density and viscosity as well as other parameters of the chemical Industry. Different measuring principles and sensor designs are available, providing the possibility to optimally adapt the instruments to specific measuring tasks and processes.

Chemical Markets Abroad

JAPANESE EO/EG OUTPUT BOOSTED IN TIGHT MARKET

The Japanese petrochemicals industry has continued to grow strongly in 1989, according to figures released by the JPCA. Extra production has been achieved by capacity creep and debottlenecking. Japan's EO and EG producers have enjoyed a particularly strong year, benefiting from tight market conditions following major explosions at BP's Antwerp unit in 1987 and BASF's plant in 1988. BP's Antwerp unit restarted in spring 1988 but it is still uncertain when BASF's 150,000 ton/-year plant will be recommissioned.

The reduced capacity in Europe has led to a tightening in the world marketplace. Far Eastern textile producers were strong buyers in 1989, particularly those in China. Japanese producers had been operating well below capacity in 1987 and 1988.

Rising prices in 1989 caused Japanese producers to step up production to fill the gap in the market following the European production problems. Utilising spare capacity and some additional debottlenecking has resulted in EO production ahead 33.5 per cent on 1988 levels, at 0.51m ton. EG production was 56.7 per cent ahead at 0.349m ton. Q4 was particularly strong. However, market sources suggest that the continuing mild weather and slower demand from the Far Eastern textile industry has already changed the balance in the market, which is now long in EG.

Ethylene production rose by 10.8 per cent to an estimated 5.6m ton in 1989. Currently, Japanese domestic ethylene consumption is around 5.9m ton, so there is still a requirement to import ethylene to satisfy both domestic and export demand.

New projects may begin to reverse this net import position. The most advanced is the 450,000 ton/year Mitsubishi Kashima ethylene plant, which could be completed by spring 1992. Japanese ethylene exports may be also affected by the ethylene projects underway in other Pacific Rim countries. ldPE production is 17 per cent ahead of 1988, at 1.5m ton. hdPE and PP have grown less spectacularly at 10 per cent and 10.6 per cent, respectively.

Acetaldehyde production was 6.9 per cent ahead at 0.356m ton. Acrylonitrile production rose only 1.9 per cent to 0.611 ton. The reduction in China's purchases in 1989 following strong buying in 1988 and slow demand for acrylic fibres from Far Eastern producers is cited as the main reason behind these poor figures.

Benzene production rose 11.6 per cent to 2.6m ton. Plants have been running at full capacity, although som demothballing and new plant wi loosen the tight supply situation. Japan production capacity for benzene coul double if all production expansions cu rently under consideration are imple mented.

Toluene production increased by 5. per cent to 1.05m ton. However, xyle was a strong feature: production rose 2 per cent to 1.99m ton.

Japanese production figures ('000 metric tonnes)

	1988	1989E	% Increase	Q1	Q2	Q3	Q4E
Ethylene	5056.8	5603.7	+10.8	1377.9	1371.2	1347.4	1507.2
LdPE	1282.9	1501.6	+17.0	368.6	369.9	347.2	415.9
HdPE	959.3	1055.0	+10.0	262.3	237.1	263.2	292.4
PP	1559.4	1724.0	+10.6	435.0	423.7	381.2	487.6
EO	510.3	681.2	+33.5	159.9	166.3	156.6	198.4
EG	349.0	546.9	+56.7	122.6	132.1	121.6	170.6
Benzene	2603.0	2905.8	+11.6	721.3	717.3	718.7	748.5
Xylene	1987.9	2486.2	+25.0	622.1	566.1	653.5	644.5

PHENOL PRICE DRIFTS IN TURNING MARKET

Phenol quarter one contracts hav been settled at DM1,550-1,600/ton, drop of DM100/ton on the previou quarter. This settlement marks the thir substantial contract decrease in a row In quarter one 1989 phenol contract price stood at DM2,000-1,050/ton, th product has lost approximately 25 pe cent in price value over the year. It i estimated that phenol demand wi remain relatively stable with growth a 2-3 per cent in the coming years.

Settlement in the phenol mark appears to have changed direction in th last year, with influence shifting fro producers to buyers. The tight phen market experienced throughout 198 was mainly unexpected, with buyer feeling they had little option but t accept a series of price hikes each quar ter.

Now it is the producers who feel th customers should not push too har because there is a real danger this coul develop into a price crash. Phenol sup pliers feel that prices have fallen enoug over the last year, and hope that numb ers have now bottomed out. They argu that in quarter four phenol number dropped by more than the benzene an propylene feedstock costs, so diminish ing margins.

Customers agree that the new lowe prices have eased their difficultie allowing them to be more competitive i

the market. This is especially true of the phenolic resin sector. However, with most European economies undergoing some degree of slowdown, reflected in a decrease in housebuilding, a further feedstock dip would not go amiss. It is argued that another 4-5 per cent could come off the phenol price.

A number of factors are behind the downturn in phenol prices, improved availability being one. Phenolchemie has improved its capacity by 100,000 ton/year to 500,000 ton/year after debottlenecking schedule. ERT has upped output at the 85,000 ton/year Huelva plant, while Montedipe has raised the nameplate capacity at its 275,000 ton/-year unit.

Cheaper deepsea material continues to undermine European prices. The majority of the lower priced imports are coming from the Eastern block, although players argue that their product does not meet Western European specification.

It is estimated that the spot phenol undercuts European prices by up to 10-15 per cent. US product is now emerging in Europe, again vastly undercutting domestic product. Observers say that the US market was so poor in 1989 that players may well be dumping product in Europe to lower inventories.

The Far Eastern market is showing no signs of importing the quantities of material it took in 1988. With Japanese expansions due on stream in the next two years, players doubt whether great export opportunities will return.

CMA CALLS FOR FREER INVESTMENTS

The US chemical industry can best maintain its competitiveness in world markets by maintaining a free-flow of international direct investments, a Chemical Manufacturers Association (CMA) representative told a recent congressional panel.

According to Nancie Johnson of the CMA and manager of international trade & investment at Du Pont, governments should resist attempts to impose barriers on foreign direct investment, not only in the US but elsewhere as well. The US chemical industry has one of the highest levels of foreign investment, yet still made a large positive contribution to the nation's current account balance.

In 1989 US chemical exports outstripped imports by some $16bn. Net income from international investments, profits from overseas operations, licensing fees and royalties should match 1988's surplus of $4.3bn. In total, the chemical industry's contribution to US international accounts should amount to $20bn in 1989, said Johnson.

UPTURN IN JAPANESE BTX

Japanese aromatics producers have enjoyed considerable growth rates over the past few years. This success has led to numerous expansion plans which could substantially alter the BTX supply and demand balance. It is estimated that Japanese production of aromatics reached 7m ton in 1989.

The increase in Japanese downstream aromatic derivatives explains why many producers are considering BTX expansions. In 1989 paraxylene production rose by 20 per cent, according to MITI. Styrene output showed an upturn of 17 per cent, with cyclohexone, phenol and MDI production all showing hikes above 10 per cent.

In 1989 Japanese benzene plants ran flat out, producing approximately 2.8m ton. Strong demand for styrene monomer and polymer, ABS and other resins, encouraged producers to run to capacity. The benzene supply and demand balance is now altering as a number of de-mothballed units start to influence the market. By 1990 Japanese demand is predicted to reach 2.8m ton/year, which would set a new record high. Production will increase by 2.4m ton in 1993.

THERMOPLASTIC ELASTOMERS FACE MIXED PROSPECTS

Thermoplastic Elastomers (TPEs) will continue to penetrate the market for general rubber products in Europe, showing a growth rate in the region of 5 per cent/year up to 2000. Within this overall figure the high performance, higher cost TPEs will show much higher growth rates, possibly between 10 and 12 per cent according to John Barber of Rapra Technology in the UK. These figures compare well with growth rates for rubber which are expected to lie around the 5 per cent mark up to 2000, higher than experienced over the last five years.

As Table 1 shows, elastomeric alloys, copolyesters and polyether block amides (PEBAs) will lead the field in terms of growth, though from a much smaller base level of usage. This is not surprising as the styrenics and thermoplastic olefins (TPOs) are at a more mature stage of the product cycle. Indeed, TPOs, widely used in Europe for car bumpers, are likely to be affected by competition from other materials with improved properties, says Barber.

Outlets showing good growth potential are the automotive sector and hot melt adhesives, in which the demand for styrenics is predicted to rise by 30 per cent over the next five years.

Continued establishment of Japanese car production in Europe could boost consumption of TPEs by around 6,000 ton by 1993. Barber believes that the automotive sector is likely to take over from the footwear sector as dominant end-use for TPEs. The share could rise from 25 to 30 per cent by 1995, when it is expected that the average car will contain 6.5kg of TPEs compared with the current 4kg.

He also sees growth in the use of medical grade TPEs. Concerns about the marginal toxicity of natural rubber products and migration of plasticisers in flexible PVC are helping the trend to TPEs. It is expected that Europe will follow the example of the US, where growth is put at around 10 per cent/year. Environmental concerns may also boost TPEs as they are used to replace plasticised PVC and because they are easily recyclable, unlike thermosetting rubbers.

Barber also sees the development of blends and alloys of TPEs and other polymers can be improved with TPEs; for example, modified styrenics have proved successful in aiding the blending of PS with hdPE, hdPE with PET and PS and ABS. This can play an important factor in their recycling.

Of the faster developing TPEs, the elastomeric, alloys, such as PP/EPDM, are making good headway into the general mechanical goods market as th approximate most closely to rubber properties. New products entering t market are PP/natural rubber co pounds and PVC-based TPEs, alrea well established in Japan, but only no finding favour in Europe and the U

Table 1
European growth rates for thermoplastic elastomers (Rapra technology)

	Demand ('000 ton) 1988	1995	Increase (per cent/annum)
Styrenics	105	146	5
TPOs	63	75	2
Elastomeric alloys	7	12	11
TPUs	35	55	7
Copolyesters	6	12	10
PEBAs	5	11	12
Total	221	314	5

KOREA ON POLYESTER DUM ING CHARGES

The EC has begun anti-dumping pr ceedings regarding polyester fil imported from Korea. The proceedin were initiated after a complaint from t European plastic films, membrane a covering manufacturers associati (AEC), which represents commun polyester film producers.

It is alleged that thin polyester fi has been providing unfair competiti for community producers. The produc principal uses are magnetic tape stamping foil, metallisation and pac aging. The complaint is based on com parisons with Korean domestic pric against those charged for exports in the Community, which supposed show a considerable differential.

Between 1986 and 1989 the Korea are said to have doubled the amount thin polyester film they exported in the Community, claims the AEC. certain grades, the Korean market sha jumped from 10.5 to 16 per cent ov three years. During that period, Korea prices undercut those in the Commu ity, forcing the latter to lower prices. the same time, raw material costs h almost doubled.

Between 1988 and 1989 Communi polyester prices dipped by 11 per cer The Community market share fell fro 85 per cent to 78 per cent between 19 and 1989, reducing domestic profits a leading to financial losses for Commu ity producers. With Korean produce set to increase polyester film capacitie far beyond domestic needs, furth dumping is likely, says the AEC.

Biotechnology

JANSSEN RESEARCHERS UNEVIL AIDS BREAKTHROUGH

Researchers in Belgium have unveiled a new class of chemical which they claim acts against the human immunodeficiency virus HIV-1, but not the related HIV-2. The discovery could be a major step forward in the war against Aids.

Rudi Pauwels and colleagues at the Katholieke Universiteit Leuven and the Janssen Research Foundation in Beerse claim members of a novel series of tetrahydro-imidazol (4,5,1-k)(1,4)-benzodiazepin-2 (1H)-one and -thione (TIBO) derivatives inhibit the replication of HIV-1, the main cause of Aids, but not of HIV-2 or of any other DNA or RNA viruses. The researchers say they believe the TIBO derivatives, which are unrelated to any other antiviral agents, "are the most specific and potent inhibitors of HIV-1 replication studies so far."

They claim the TIBO derivatives are potent inhibitors of HIV-1 in amounts which are as little as 10,000-100,000 times lower than that necessary to kill the infected cell. This they contrast with the current Aids drug zidovudine (formerly AZT) and the trial compounds DDC (dideoxycytidine) and DDI (dideoxyinosione) which are equally effective against HIV-1 and HIV-2 but at much higher concentrations — only two or four orders of magnitude below their cyto-toxic concentration.

The TIBO derivatives are believed to act by blocking the enzyme is essential for viruses to replicate and spread. Although HIV-1 and HIV-2 are related, they differ in genomic sequence, antigenic properties and in the size of their proteins. The researchers have found the TIBO derivatives are specific to the reverse transcriptase of HIV-1.

Pauwels' research team has also studied the effect of the TIBO derivatives on simian immunodeficiency virus, which is closely related to HIV-2, murine moloney sarcoma virus and feline immunodeficiency virus. They report all three to be insensitive to the new compounds, rendering animal models unsuitable for testing.

Various other RNA viruses (such as polio) and DNA viruses (such as herpes simplex) are also reported to obe insensitive to the new family of compounds. Work is now progressing to identify the most suitable TIBO derivative for clinical studies in HIV-patients.

AIDS THEORY QUESTIONS DRUG R & D

A new theory which challenges the conventional view of how the Aids virus works could have major implications for the development of drugs and vaccines. The theory strengthens the argument for the use of soluble CD4 as a decoy receiptor; at the same time it casts doubts on the use of GP120 in vaccines.

The current generation of drugs, including zidovudine, attack virus replication, which can only take place once the virus has invaded cells. But scientists at the UK's Medical Research Council (MRC) now believe the HIV virus is able to destroy the immune system simply by masking the CD4 protein on the surface of healthy immune cells. CD4 plays the key role in the immune system's ability to detect and fight infection.

If the theory holds true, future drug research will need to be targeted at preventing the Aids virus from binding to CD4, rather than attacking it once it has invaded. Angus Dalgleish, head of retrovirus research at the MRC, suggests the best therapy may lie in combining soluble CD4 with zidovudine or a protease inhibitor.

The current belief that the coat protein of the Aids virus, coded GP120, could be used in a potential vaccine may also have to be discarded: the new theory implies that GP120 actually triggers Aids.

The new theory may explain: why the immune system loses its potency well before significant numbers of healthy cells have been destroyed; why other viruses that can kill cells equipped with CD4 do not cause Aids; and why only certain common infections are often the first to develop in Aids patients, rather than new bacterial infections.

CORN PLANT ADVANCE

A US biotechnology company has achieved a breakthrough with the genetic manipulation of the corn plant, which could lead to a new generation of hybrid corn species designed to maximise yield.

Bio Technica International, based in Cambridge, Massachusetts, have developed a technique by which a gene can be introduced into the DNA of a corn plant, which can then be grown producing seeds. These in turn express the gene in the next generation of plant.

Bio Technica vice president David Glass explains that the technique will enable the company to impart commercially valuable traits into strains of corn. Glass explains that Bio Technica intend to introduce insect resistance using the UK-firm Agricultural Genetic Company's (AGC) CpTi gene which it has licensed.

EPO PATENT ROW HOTS UP IN US

Massachusetts-based Genetics Institute has asked a district court in 'Mas-

sachusetts to prevent west coast competitor Amgen from allegedly infringing its patent on the genetically engineered kidney cell protein, erythropoietin (EPO). At the same time, the company has indirectly challenged Amgen's "orphan drug" status for the drug.

The injunction escalates a drawn-out US patent fight and follows an inconclusive ruling last December, which gave neither company overall rights to the production of EPO. Amgen's version, Epogen, was approved for marketing by the US Food and Drug Administration (FDA) last June and has achieved sales of $95m. to date. Genetics Institute expects to win approval for its product, Marogen, in the first half of this year. It has licensed US rights to Chugai-Upjohn.

Genetics Institute and Chugai are understood to have asked the Boston court to order Amgen to certify that it cannot assure a supply of EPO in light of the recent ruling. Under US law, the certification would allow othe FDA to approve Genetics Institute's version despite Amgen's "orphan drug" status. The status gives Amgen a serve-year marketing monopoly on EPO for treating chronic kidney failure.

Under the December ruling, Genetics Institute is allowed to manufacture abroad without infringing Amgen's patent. Its licensee, Chugal Pharmaceutical, won marketing rights in Japan in late January, where it will be sold under the trade name Epogin.

INDUSTRY CALLS ON EC FOR BIOTECH ACTION

Seven of Europe's major chemical companies have warned that Europe will fall behind the US and Japan in biotechnology unless a coherent community policy is established.

The seven — Ferruzzi, Hoechst, ICI, Monsanto, Rhone-Poylenc, Sandoz and Unilever — are calling on the European commission to resolve its many current biotechnology policy initiatives.

As a first step, they call for a clear product registration system based on safety, efficacy and quality, promotion of R & D, patent protection and the setting up of a single community market for biotech processes and products.

In a paper delivered to the commission recently, the senior advisory group of biotechnology, which represents the seven, claims Europe is falling behind the US and Japan in establishing effective biotechnology policy and therefore in the development of biotechnology itself. Already the gap is increasing and European talent and investment is emigrating to more favourable politcal environments, the group adds.

The seven are particularly concerned by EC plans to give approval to biotechnology — derived products only if the companies can demonstrate a market need. This proposal has emerged as Monsanto and other firms are trying to market animal growth hormones.

GENE LAW TIMETABLE "HASTY"

West Germany's federal health ministry hopes to push its new "framework law" regulating genetic engineering through parliament and into effect by July, despite considerable delays which have threatened its early passage.

The legislation was originally set to be in place by January 1991. However, the timetable was brought forward, following the suspension of Hoechst's permit for a genetically engineered human insulin plant at Frankfurt last November. According to the court ruling, the states have no basis for awarding permits before passage of pertinent legislation. The revised timetable has been widely criticized as hasty, especially as a number of changes need to be made to the bill.

Last October, the upper house crit ized the fact that the bill only mentio work with gene-spliced material did regulate approval of production pla The chamber of states insists the sta should have responsibility for appr ing facilities.

Other points of controversy centre the participation of scientists critica genetic engineering in the central co mittee on biological safety. This is body that advises the federal gove ment on the public hearing requireme for new products, worker protecti waste disposal and wastewater d charge.

Legal experts in the lower ho have complained that the federal g ernment wants to regulate too ma points outside parliament. The che cal industry wants to see the public he ing requirement limited only high-risk projects.

While the majority Christian de crats would like to see the law pass following changes made by the lo house, the opposition social democr and Greens have called for the bil be withdrawn and redrafted altoget

WELLCOME, PFIZER WIN FD APPROVALS

The US Food and Drug Adminst tion has approved the drug fluconaz as a treatment for two serious Ai related fungal infections, one a l endangering form of meningitis. F conazole will be manufactured marketed by the New York ba healthcare company Pfizer as Difluc

In addition, the FDA decided extend the use of zidovudine, manuf tured by Wellcome as Retrovir, patients who are at less advanced sta of infection from the Aids virus. FDA's antiviral drug products advis committee recommended to appr zidovudine for patients with CD4 hel cell levels of 500 or less.

News About New Projects

IRAN UPS AMBITIONS AT BANDAR KHOMEINI

Iran is intending to add to its original plans for the Bandar Khomeini complex. In addition to awarding contracts to supervise and advise on completing the war torn project, Iran is considering plans to build PVC and paraxylene units at the complex. A joint venture between West Germany's Krupp Koppers and Lummus Crest in the Netherlands has won a DM50m ($29m) contract to conduct a detailed technical survey of all facilities at the complex.

"Under the contract terms, the joint venture will establish a timetable for building, supply an overall budget costing and draw up bid documents", a spokesman said. Moreover, the joint venture will provide equipment for the study. The joint venture is already supervising Iranian contractors in the reconstruction of an LPG unit and utility facilities. The whole study is expected to be completed by October of this year.

Iran intends to build all the plants previously planned for the complex but is planning two additions. It looks certain that a 200,000 ton/year PVC unit will be built at Bandar Khomeini. "A 150,000 ton/year VCM unit is already planned for the Bandar Khomeini complex so it would make sense for Iran to site a PVC complex there", commented one industry source. It looks likely that a PVC plant would be completed by 1993.

Although many of the details for the proposal need finalising it is possible the facility will use Huls technology. "Iran purchased basic engineering from Huls two years ago so it will probably also opt for the company's technology". Iran is also considering building a paraxylene production unit at Bandar Khomeini. A 144,000 ton/year mixed xylenes unit has already been earmarked for the complex and a 60,000 ton/year DMT facility is being built at Isfahan. "It would be logical for Iran to have a paraxylenes unit to supply the DMT facility", the industry source added.

The Iranian government has repeatedly confirmed its ambition to complete Bandar Khomeini and to be self-sufficient in petrochemicals. Current estimates indicate Iran imports some $1bn/year in petrochemicals.

BEROL BOOSTS ETHYLENE AMINES

Sweden's Berol Nobel, a subsidiary of Nobel Industries, is upping capacity of its Stenungsund ethyleneamines plant by some 6,000 ton/year, bringing capacity to 25,000 ton/year. It is also considering a higher ethyleneamines plant, possibly in a joint venture in another geographical area, according to Agne Svanberj, the company's amines division manager.

The Skr70m ($11.2m) Stenungsund expansion is set to come on stream this October, employing propriety technology based on monoethanolamine and ammonia. The process avoids discharge of sodium chloride unlike the traditional ethylene dichloride (EDC) process. A limitation of Berol's process is that it does not produce higher ethyleneamines. Svanberj confirms his company is developing a new process to produce these, based on raw material from the expanded Stenungsund plant.

A plant with a capacity of about 10,000 ton/year could come on stream between 1992 and 1994, maintains Svanberj. A location has not been fixed. Svanberj confirms "it could be a joint venture in another geographical area. It could be, for instance, in the States, there are other possibilities". The company does not have a base in the US, but it is the biggest market for higher ethyleneamines. Shipping feedstock from the expanded Swedish facility would not be a problem, says Svanberj.

Ethyleneamines are building blocks in the chemical industry for such products as polyamines, and are used in areas such as detergents, asphalt, textiles, paper, paint and veterinary medicine. Some applications such as lube oil additives, fuel additives and epoxy curing agents use higher ethyleneamines only. Texaco is expanding its ethyleneamines capacity in the US later this year.

TECNIMONT SUCCESS

Techcorp, an Iraqi government agency, has awarded Italian firms, Tecnimont and Oronzio de Nora Technologies, a contract for a 60,000 ton/year $70m chloralkali unit at the PC2 complex. The contract calls for licensing basic design, detailed engineering and equipment supply. Moreover, Tecnimont will be responsible for technical supervision. The contract covers 26 months.

The $2.5 bn complex will receive technical support from Unido. A technical cooperation agreement confirming this has been signed by Unido director-general Domingo L. Siazon and Techcorp director-general Osama Hamadi. The PC2 complex is targetted for commissioning by the end of next year.

PROJECTS ROLL ON AT SPAIN'S REPSOL

A conclusion to Repsol Quimica's feasibility study on a $2bn petrochemical complex at Cartagena, Spain, expected at the end of 1989, has been deferred. Plans call for a complex centred on a 400,000 ton/year ethylene plant. A Repsol spokesman was unable to give any indication of when a decision would be reached, but confirmed that if it is delayed beyond a few months the start up date of 1994 could be pushed back.

Repsol is not new to Cargagena. Repsol Petroleo operates a 6m ton/year refinery there. Repsol Quimica is currently negotiating with Enip of Algeria, with a view to installing production capacity in Algeria. It is too early, says Repsol's spokesman, to define products and capacities. In a broader agreement between the Spanish and Algerian governments, Algeria's Enagas has a contract to supply Spain with natural gas.

Apart from Cartagena, Repsol Quimica has ten projects, worth a total of \$179.9m, earmarked for its Bilbao, Puertollano and Tarragona sites. At Bilbao it plans a 100,000 ton/year polypropylene plant in joint venture with Petronor. The \$88m project is due on stream in 1992.

At Puertollano it is studying expansion of an 80,000 ton/year PP unit to 105,000 ton/year in a \$7.8m investment set to start up in 1992. Expansion of high density polyethylene and propylene glycol will be completed at the site this year. hdPE is being upped from 60,000 to 75,000 ton/year in a \$2.2m investment, while PG capacity is increasing by 5,000 ton/year at a cost of \$0.5m. The second phase of an lldPE project came on stream at Puertollano last year, raising capacity by 25,000 ton/year to 40,000 ton/year.

As part of its policy to develop downstream integration between monomer and polymer, Repsol Quimica is studying the possibility of building a polymethyl methacrylate plant at Tarragona, where it already has a 35,000 ton/year methyl methacrylate facility. Plans call for 9,500 ton/year of granules, ready at the end of 1991, and 4,500 ton/year of PMMA sheet coming up during 1992.

Also under study at Tarragona are two successive ldPE expansions; the first in 1991 by 12,000 ton/year and a second in 1992 by 30,000 ton/year. These represent investments of \$4.5m and \$12.2m, respectively. Other projects at Tarragona are a \$17m hdPE capacity hike by 50,000 to 140,000 ton/year, due on stream this year and an expansion of butadiene capacityby 30,000 ton/year during 1991, costing \$13m. Repsol also has plans for its share of output from its PP joint venture plant with Taqsa at Tarragona. It intends to change the product mix of copolymers in a \$10.4m investment next year.

MITSUBISHI PICKS TOYO AND LUMMUS FOR CRACKER

Toyo Engineering Corp (TEC) has won the engineering contract for Mitsubishi Petrochemical Co's recently announced cracker at Kashima. Work has just begun and completion is scheduled for mid-1992. The US's Lummus Crest is providing its SRT V short residence time ethylene pyrolysis technology for the 450,000 ton/year plant.

Other contenders for the cracker were Kellogg, which was offering its own technology, and Chiyoda, but TEC offered the best price. On the process side, Mitsubishi emphasised that it was looking for a plant that would be competitive for some years. Most of Japan's ethylene units were built 15-20 years ago and therefore are smaller and less efficient than those in the US and Western Europe, for example. The new plant will be able to process a variety of feedstocks, including C_2 and C_4 LPGs, naphtha and LNG.

Contracts for the downstream projects are currently being evaluated. Facilities planned are for 150,000 ton/year benzene, 80,000 ton/year hd/lldPE, 80,000 ton/year PP, 110,000 ton/year EO and 100,000 ton/year EG, all for 1992 completion. Total installed cost of the project, including utility and downstream units, is around Yen 105bn (\$720m). Of this, Mitsubishi Kasei Corp. is to invest Yen20bn (\$138m) in the ethylene/polyolefin units.

The ethylene facility will be built in two stages, with 300,000 ton/year coming on stream in 1992 and a further 150,000 ton/year later. This will brin Mitsubishi Petrochemical's ethylen capacity at Kashima to 830,000 to year. Of the initial 300,000 ton aroun a third each will go to meeting Mitsub ishi Petrochemical's current shortag feedstock for the downstream units an supply to third parties.

Meanwhile, Maruzen Petrochemic Co., Sumitomo Chemical Co. an Mitsui Petrochemical Industries hav begun a feasibility study on the planned 500,000 ton/year ethylen cracker at Chiba. This follows the decla ration late last year that Ube Industrie and Mitsui Toatsu were beginning study for their 500,000 ton/year plan The remaining three Japanese ethylen projects are unlikely to come to fruition

Planned Japanese ethylene capacit

Company	Location	Capacity ('000 ton/year
Mitsubishi Petrochemical	Kashima	450
Maruzen Petrochemical/ Mitsui Petrochemical/ Sumitomo Chemical	Chiba	500
Mitsui Toatsu/ Ube Industries	Ube	500
Shin-Dai-kyowa Petro-chemical/ Tosoh	Yokkaichi	500
Asahi Chemical	Mizushima	300
Showa Denko	Ohita	300
Total		2,250

NESTE CONFIRMS HDPE

Finland's Neste Chemicals has con firmed the first part of its plans t develop the Epsi polyolefins complex a Sines, Portugal. The company w spend more than \$50m on raising hdP

capacity by 40,000 ton to 120,000 ton/year, and building a new unit to produce 20,-30,000 ton/year speciality compounds.

The unit uses Mitsui Petrochemical's low pressure polymerisation technology and the original engineering contractor was Technip. Neste's board of directors has given planning approval and final decision is expected before the summer, on completion of pre-feasibility studies. Start-up of these units is scheduled during 1992.

Studies are still underway for expansions of the ldPE and PP units, which currently produce 120,000 and 50,000 ton/year respectively. Neste says its aim "through this expansion, is to strengthen its position in southern Europe as a producer of speciality plastics".

JAPANESE LLDPE JV

Sumitomo Chemical of Osaka and Tosoh Corp of Tokyo are forming a 75:25 joint venture this year to manufacture linear low-density polyethylene. An 80,000 ton/year plant is planned for the Chiba site of Sumitomo Chemical It will use Sumitomo's gas phase technology and should be onstream by the autumn of 1991. The engineering contractor is expected to be chosen in March. Cost is put at $55.5m.

Sumitomo and Tosoh currently produce and market lldPE through a joint sales company, Union Polymer Corp. of Tokyo. Each company holds equity in Union Polymer, along with other polyolefin makers. Product from the new plant will also be sold through Union Polymer, except for speciality grades. The joint venture partners say they will locate a further lldPE plant at the Yokkaichi site of Tosoh. Capacity and timing will be announced later, when the lldPE supply-balance situation warrants further expansion, they say.

SHELL EXPANDS US EO/EG CAPACITY

Shell Chemical is to expand capacity for ethylene oxide/ethylene glycol in the US with the construction of a Greenfield plant. This will have a minimum capacity of 204,000 ton/year EO and a similar capacity for EG. Location has not been decided but Shell has said it will be on the US Gulf Coast. The plant is currently in the design phase, which should be completed in around 90 days. Start-up is scheduled for 1993.

The plant will be Shell's third EO/EG unit in the US and will position the company securely as the number two supplier in the market, after Union Carbide. Its two existing units are located at Geismar, Louisiana, and give Shell capacities of 374,000 ton/year EO and 238,000 ton/year EG. These and the planned unit use Shell's own EO process technology based on ethylene and oxygen. Ethylene for the new plant will be sourced from Shell refineries at Norco, near Geismar, and Deer Park, Houston, with the bulk coming from the Norco refinery.

A shell spokesperson said that most of the output from the new plant will be sold on the merchant market, with very little used by Shell itself. Union Carbide and Texaco Chemical are believed to be concentrating their capacities on inhouse derivative production. Union Carbide last year announced plans to invest $200 m to upgrade and expand, by 180,000 ton/year, its EO capacity at Taft, Louisiana. The project is scheduled to start up in the third quarter of 1991.

PLANS REVIVED FOR KPC'S CRACKER IN KUWAIT

Kuwait Petroleum Corp. (KPC) has revived plans for a petrochemical complex estimated to represent an investment of more than \$2bn. Proposals centre on the ethylene cracker which, according to a KPC spokesman, will be "worldscale", with associated units for high density and linear low density polyethylene, styrene monomer, polystyrene, ethylene glycol and ortho- and paraxylene.

The complex is to be built in the Shuaiba industrial area, confirms KPC. A decision has not yet been made on which KPC company will operate the complex. Some expect it will be run by the corporation's petrochemicals subsidiary, Petrochemical Industries Co. (PIC). At this stage no subsidiaries are involved.

Feasibility studies are complete and KPC is currently preparing to send out requests for quotations from process licensors, confirms KPC's spokesman. Selection of technologies is expected to start within a few months. By the year end KPC hopes to have chosen technology for all units.

If all goes according to plan, the units should come on stream more or less together in 1995. The project was first put forward in the early 1980s when KPC was busy organising its refining activities, but was later shelved.

In a separate project, PIC is building a 100,000 ton/year polypropylene unit in the same industrial area. The project, which was first announced as an 80,000 ton/year unit, is based on Union Carbide Unipol technology and is due on stream in the second half of 1992. Tender documents for contractors are being prepared, confirms KPC.

Another KPC company, Kuwait National Petroleum Company (KNPC), is implementing an MTBE project with associated alkylation unit at its Mina al-Ahmadi refinery. This is at the same stage of implementation as the PIC polypropylene projects and is expected on stream in the same period, the second half of 1992.

CIRES BOOSTS PORTUGESE PVC

Portugal's Companhia Industrial de Resinas Sinteticas (Cires) is to boost polyvinyl chloride (PVC) capacity at its Estarreja plant for start-up in 1992. An increase of 15,000 ton suspension grade will bring total capacity of this grade to 100,000 ton/year. Emulsion grade at Estarreja will remain at 10,000 ton/year.

The expansion also involves construction of a pipeline from Aveiro port, ten miles south of Estarreja to carry vinyl chloride monomer (VCM) feedstock, said Antonio Miquelino, Cires' managing director. Cires imports VCM from three European suppliers, EDC, Norsk Hydro and Rovin (an Akzo/Shell joint venture). The total investment is around \$20m.

Basic engineering has already been carried out by Japan's Shin-Etsu, a shareholder in Cires. Shin-Etsu will be providing all the technology know-how and plant construction will be managed inhouse, using local contractors. Cires is the only PVC producer in Portugal, and will sell the extra capacity on the Iberian market.

SASA PLANS ETHANOL

South African Sugar Association (SASA) has government approval in principle to build an ethanol plant at Flixton in Natal province.

Full approval is anticipated in June or July once financial aspects are clarified, according to Arch Hansen, SASA's secretary. Initial capacity is set at 108m litre/year, rising to 150m, based on feedstocks of molasses and syrups.

The project will go for tender as soon as approval is given. If contractors were appointed by September it could be on stream by March 1992, says Hansen. The plant was initially planned for Richards Bay, 15 km north of Felixton, where there is a deepsea effluent pipeline. The idea now is to site it next to Tongaat-Hulett's Felixton sugar mill and thereby cut raw material transport costs, and connect to the pipeline.

NESTE MTBE JV NOW UNDERWAY

Further details of Neste's Can \$350m (\$294m) joint venture MTBE project in Canada have been disclosed. Neste and partner Petro-Canada each have a 50 per cent share in the joint venture which will own and operate a 530,000 ton/year MTBE plant in Strathcona County, near Edmonton in Alberta.

The site, says Neste, has enough room to allow for expansion, which the parties expect will occur as MTBE demand grows. Fluor Daniel Canada is responsible for engineering, procurement and construction management. Engineering has been underway since May last year, with construction set to begin this spring, subject to regulatory approval. Start-up is expected at the end of 1991.

The project was initially a joint venture with Canada's Trans Mountain Pipeline, Neste having a majority stake. Neste subsequently bought TMP's 25 per cent stake and began a search for new partners. Last summer Canada's state-owned Petro-Canada took on TMP's stake and subsequently raised its holding to 50 per cent.

TENGHIZ LIVES ON

Montedison says a report that the Tenghiz petrochemical project in the Soviet Union has been suspended is untrue. According to Montedison's spokesman all parties in the Tenghiz

venture — Montedison, Enimont, Occidental Chemical, Marubeni and the Soviet Union — met in Moscow on 25 and 26 January and there was no mention of suspending the project.

Occidental Chemical declined to comment on the project's suspension. An Enimont spokesman said that the current changes within Enimont itself could be a contributory factor in any delay. The article in question cited environmental concerns and a new Soviet policy to give consumer goods production priority as reasons for the suspension.

SOLVAY WINS THAI PVC UNIT

Belgian engineering/contracting company Tractebel has picked up the contract to build Solvay's polyvinyl chloride plant in Thailand, according to industry sources. The project calls for a 135,000 ton/year PVC plant at Mab Ta Pud on the Gulf of Thailand. The plant will be based on Solvay technology and is due on stream in January 1992.

It forms part of a $330m complex including a 140,000 ton/year VCM unit, also based on Solvay technology and due on stream in mid 1994, as well as a chloride plant of 87,500 ton/year for which an on-stream date is not fixed. The three projects are planned by Vinythai, a joint venture between Solvay (49 per cent) and Thai partners, of whom Charoen Pokphand is the largest shareholder with 49 per cent.

Neither Solvay nor Tractebel could confirm appointment of the latter for the PVC plant, though, according to industry sources, a letter of intent has been signed. Tractebel is a diversified company involved in power generation and distribution, civil engineering and industrial construction.

UHDE BUILDS VENEZUELAN VCM

Hoechst engineering subsidiary, Uhde, is to head the Venezuelan consortium Consorcio Vinilos El Tablazo, which has been set up to build a vinyl chloride monomer (VCM) plant in a joint venture with Pequiven. Other members of the consortium are Ferrostaal AG of Essen, West Germany, DSD-Compania General de Industrias CA of Caracas and Tecnoconsult Ingenieros Consultores SA.

The 130,000 ton/year VCM plant, scheduled to go on stream in 1992, allows for the production of 150,000 ton/year ethylene dichloride (EDC) through direct chlorination and 110,000 ton/year EDC by oxychlorination, for start up in 1991. The Hoechst process is being licensed to Pequiven. Uhde's share of the total contract is DM100m ($60m).

IDEMITSU REVISES ACRYLIC ACID PLANS

Idemitsu Petrochemical has revised plans announced in 1988 to build a ¥10bn ($71m) acrylic acid and esters facility in Japan. Capacities have been increased and the project is set to be constructed at the Aichi refinery site of Idemitsu Kosan instead of at Tokuyama. Plans now call for 50,000 ton/year acrylic acid and 50,000 ton/year esters (mainly butyl ester and 2-ethyl hexyl ester) set to go into commercial production in July 1991. The company will be employing its own technology.

News from Japan

JAPAN'S ETHYLENE PRODUCTION IN 1989 TOPS 5.6 MILLION TONNES

Japan's ethylene production in 1989 marked a record high of 5,602,300 tonnes, 10.8% more than in the preceding year, according to recent figures compiled by the Ministry of International Trade and Industry. Monthly production in December of the same year also high an all-time record to reach 515,000 tonnes, up 8% over the corresponding month of the previous year. The ministry sees the situation remaining favourable supported by the continuous expansionary phase of domestic demand.

Ethylene production turned upward after hitting rock bottom in 1985, bolstered by strong domestic demand. Afterwards the production figures involved increased to 4,291,400 tonnes in 1986, 4,584,800 tonnes in 1987 and 5,056,900 tonnes in 1988, all display-ing a rapid pace of growth.

In 1989, too, the background to the ıpswing shown in the MITI statistics was steady demand growth of ethylene lerivatives including low density polythylene, high density polyethylene, olypropylene, styrene monomer, and 'C resin. Furthermore, among major actors for the upward path were the onsiderably better achievements in ebruary and August. In these months roduction usually slows down due to eriodic plant modifications, but last ear, it registered 436,100 and 471,300 nnes for the respective months. In ldition, the production level in the first alf of the year went as high as 748,000 tonnes, only a little below the 854,000 tonnes of the last half.

Such being the case, trade in 16 items mprising ethylene and other derivaes (in terms of ethylene) is also pected to show an export surplus for e first time in six years. Looking to 1990, MITI predicts that production will also trend upward without any dampers.

STRONG DEMAND MAKES JAPANESE CHEMICAL BUSINESSES PROSPEROUS

Japan Chemical Industry Association (JCIA) has revealed its survey results of the business situation of chemical companies in the last quarter of 1989 based on the answers to questionnaires sent to them. JCIA has carried out such quarterly surveys on a regular basis. The survey shows that Japanese chemical business was in an "active" state in the last quarter as sales generally continued increasing, mirroring vigorous demand from user industries and strong demand as a whole. Consequently, the business condition index (BI) recorded an increase after dropping the two preceding quarters.

On the other hand, the number of companies finding bad signs in the period in question as regards business development surpassed that of those finding good signs for it. This is the first time this has happened in three years. As for prospects for 1990, many forecast that business will maintain a good state until around the middle of the year but turn for the worse in the second half.

The BSI (business survey index) in terms of sales — the ratio of the number of companies replying that they expected "sales growth" to that of those answering "sales drop" — showed a plus, after seasonal adjustment, for the twelth consecutive period and a larger degree than expected earlier. As for stockpiles, slightly more companies expected a "decrease' than those projecting an "increase". Many companies continued to see their stockpiles as being "appropriate" but their number slightly dropped from that in the preceding survey, while that of companies replying "short" or "excessive" increased correspondingly.

As regards business conditions in the said period, the number of companies answering "bad" decreased and most of the companies questioned said 'fairly good" or "good". As a result, the business condition index stood at 5.9, showing a plus for the tenth consecutive period, although the growth rate had continued to decline in the two preceding quarters.

On the question of factors affecting ordinary profits, more companies found "aggravation factors" in the period in question that those replying "improvement factors". This is for the first time in three and a half years. Many cited as the "aggravation factors" decreased prices, and increased material and labour costs. Many also forecast that such a state will further intensify in the following quarter.

As the major problems to be tackled in 1990, the largest number of companies mentioned "promotion of R & D", followed by "sales expansion", "stable procurement of materials, energy conservation, cost reduction by means of modernisation of manufacturing facilities", "improvement of corporate structure and raising of management efficiency", "globalisation" and "business diversification and changes as well as streamlining and integration of business organisations".

50,000-T/Y BISPHENOL-A PLANT WILL BE JOINTLY BUILT IN KASHIMA BY 1992

Mitsui Toatsu Chemicals Inc. and Mitsubishi Petrochemical Co. have reached agreements to the effect that their equally owned joint venture —Kyodo Bisphenol Seizo Inc. — will construct a 50,000 t/y bisphenol-A plant at the latter's Kashima factory, aiming at operation start-up in October 1992. To supply material phenol to the new plant, Mitsubishi Petrochemical will expand its phenol capacity at the Kashima factory to 180,000 t/y from 130,000 t/y.

Some other companies are now implementing or planning bisphenol-A expansion and Mitsui Toatsu itself will add 20,000 t/y capacity to its 60,000 t/y Nagoya plant by this October. In this situation, it had been rather reluctant to expand the capacity of the joint plant at Kashima, although it basically agreed with Mitsubishi Petrochemical on bisphenol-A plant construction at Kashima at an appropriate moment. Their joint venture, Kyodo Bisphenol, has been operating a 50,000 t/y plant since April 1988 at the former's Osaka factory.

The final conclusion has come about in view of the fact that there has been strong demand for polycarbonate and epoxy resins — major outlets of bisphenol-A — the once-prominent export drives of U.S. suppliers have apparently waned, and domestic users are increasingly eager to receive supplies of the product on a stable basis.

On the part of Mitsubishi Petrochemical, the new plant construction will result in an outlet for the materials that will become available with completion of its new 300,000 t/y ethylene plant at Kashima. The bisphenol-A plant will cost about ¥6 billion and adopt the manufacturing process developed by Mitsui Toatsu.

In addition to this plan, GE Plastics Japan Ltd., — a joint venture of General Electric, Mitsui Petrochemical and Nagase & Company — has already begun undertaking capacity expansion for bisphenol-A, and Nippon Steel Chemical and Idemitsu Petrochemical have decided to advance into this field.

JCIA FORMS GROUP TO STUDY GLOBAL ENVIRONMENTAL ISSUES

At a board of directors meeting on January 23, Japan Chemical Industry Association (JCIA) established a committee to study measures for dealing with global environmental problems.

The committee will in turn set up an energy countermeasures sectional group, chaired by Tokuyama Soda managing director S. Akiyama, within a broader technology committee tasked with examining ways to control carbon dioxide emissions. Members of the energy countermeasures group will be drawn from related chemical companies and organisations and concentrate on the following activities: Gathering data on worldwide movements related to stabilising CO_2 emissions, conducting an investigation of actual conditions and making forecasts pertaining to CO_2 emissions, and studying conditions and potential means for conserving energy and converting to alternate energy sources.

Finally, an environmental sectional group will be formed within the geographical environment committee to consider problems related to global warming and ozone layer destruction, with specific investigations and other studies assigned to an environmental planning group.

THREE FIRMS TO PROMOTE JOINT EPOXY-RESIN VENTURE

Asahi Denka Kogyo K.K. is scheduled to invest in Nippon Epoxy Polymers Co. — a joint venture between Mitsui Petrochemical Industries Ltd. and Dainippon Ink and Chemicals, Inc. (DIC). This was recently agreed on among Asahi Denka Kogyo and the two parent firms.

The joint company will be owned 50% by Mitsui Petrochemical, 40% by DIC and 10% by Asahi Denka. They will receive epoxy resin from their joint firm in proportion to their investment ratios.

Nippon Epoxy Polymers was set up last February as an epoxy-resin maker by Mitsui Petrochemical and DIC on a 51/49 ownership basis. They will transfer part of their shares in the joint venture to Asahi Denka.

Nippon Epoxy Polymers is building a 22,000 t/y epoxy-resin plant on the site of Mitsui Petrochemical's Chiba works (Chiba Prefecture). The plant will be put into commercial operation this summer. Asahi Denka envisions building up its epoxy resin operations by deriving supplies of cost-competitive epoxy resin from the joint company. Mitsui Petrochemical and DIC expect Asahi Denka's capital participation to help push the operation rate of the said plant to a high level.

Japanese demand for epoxy resin is steadily expanding. Market competition involving the product is being intensified in Japan with growing imports of the product in the background.

MMA MONOMER PRODUCTION IN 1989 LIKELY TO HAVE SET RECORD

Production of methyl methacrylate (MMA) monomer — raw material for acrylic resin — in 1989 is estimated to have recorded 354,000 tonnes, up about 8% over the previous year, and thus it has become almost certain that 1989 MMA production hit an all-time high, especially when taking into consideration that sales of monomer used for paints, etc., increased by nearly 20% over the preceding year and that there was brisk production of products in the polymer field such as cast and extruded sheets.

According to Japan Methyl Methacrylate Resin Association, MMA monomer production in the first 11 months of 1989 registered 324,300 tonnes, an 8% increase over the same period of the previous year. This indicates that the pace of production in the latter half of 1989 was higher in comparison with the first six months which recorded a 6% gain over the preceding year.

Brisk production was mainly supported by monomer sales. The sales both at home and abroad were in full swing. In Japan, combined demand

from all fields — paint, paper-coating, and scagliola use, etc. — showed a marked rise of 19 per cent. Exports mainly to Southeast Asia registered a 2 per cent gain in the first half over the same period of the previous year but in and after August they showed a marked increase of over 12 per cent because exports to Taiwan increased due to the shutdown of KMC (Taiwan)'s plant.

Polymer-applied molding materials for captive use and synthesised using monomer as raw material recorded a 9 per cent rise. Extruded-sheet production in the first 11 months of 1989 registered 38,617 tonnes, a 10 per cent gain, and production of cast sheets recorded 33,523 tonnes, a 7.6 per cent increase over the same period of the previous year.

In this period, production of polymer exceeded the 1988 result. Demand for automatic vending machines and car ports continued to increase. In particular, cast sheets, for which a low growth rate had been expected, put up a good fight.

Molding compound almost reached double-digit growth, supported by an increase in audio-related products such as laser discs and a rise in equipment and parts related to automobiles.

The MMA industry considers the high growth of 1989 to be attributable to the fact that there were no dampers from the viewpoint of application and that MMA is becoming a resin/monomer users find easy to use.

DEPENDENCE ON JAPAN'S HDPE SUPPLY INCREASING

Southeast Asian countries are increasingly depending on Japan for high density polyethylene supply since Phillips Petroleum (U.S.)'s 700,000 t/y high density polyethylene plant came to a standstill last October. Singapore — a major HDPE supplier in Southeast Asia — has curtailed HDPE exports and, what is worse, supply of Saudi Arabia-made HDPE to Southeast Asia is declining due to the worldwide shortage of the product itself.

In the circumstances, Japanese HDPE makers are operating plants at full capacity but their production-expansion efforts are reaching the limit. Their combined HDPE production last October exceeded 100,000 tonnes, the first time the 100,000 tonne level has been surpassed as far as monthly production is concerned. Japan's HDPE production last year was over one million tonnes, up more than 10% over the preceding year.

HDPE exports from Japan are rapidly growing. Japanese HDPE suppliers are exporting the product by partly reducing their domestic supplies. Market prices for polyolefin including HDPE will show an upward trend. In the States and Southeast Asia, HDPE is being replaced by LDPE and PP.

Some Japanese petrochemical companies are considering expanding production capacity for HDPE in combination with capacity build-up for LDPE but are less intent on capital spending for the former product than in the case of L-LDPE and PP. It is no longer possible to scale up HDPE production in Japan through debottlenecking of existing HDPE plants.

JOINT VENTURE TO PRODUCE STAMPABLE PLASTIC SHEET

Kawasaki Steel Corp., Sumitomo Chemical Co., Takiron Co., and C. Itoh & Co. have agreed to establish a new company for producing high-performance, fiber-reinforced stampable plastic sheets.

The venture, to be named K-Plasheet Corp., will be capitalised at ¥240 million, 60 per cent of which will be supplied by Kawasaki Steel, 20 per cent by Sumitomo Chemical, and 10 per cent each by Takiron and C. Itoh.

K-Plasheet will incorporate production knowhow from Wiggins Teape Group Ltd., a major British chemical paper producer, with start-up targeted for summer 1991 at a 5,800 tonne-capacity plant to be constructed within Kawasaki Steel's Chiba Works.

The four participating companies are targeting annual sales of ¥5 billion within five years. Stampable sheet is a plastic composite made of polypropylene or other thermoplastic resins reinforced with glass fiber. Like steel sheet, it is pressable into desired shapes or forms.

The composite is light, strong and resistant to both heat and corrosion, suiting it well to applications in the automotive, electric machinery, construction and engineering industries, where demand for the material is expected to grow steadily.

To produce the stampable sheet, the joint company will employ Wiggins Teape's paper making process, a technique that enables uniform dispersion of glass fibers and resin powder. Compared with plastic sheet made with conventional means, formability is reportedly superior and appearance pleasing, making it suitable for exterior car panels.

In addition, the material is based on materials with excellent flow characteristics, permitting its pressing into intricate shapes virtually no different than those produced by injection molding.

Japan's annual demand for stampable sheets is currently estimated at 6,000 tonnes, but is likely to expand to 50,000-60,000 tonnes by 2000. The automotive industry is expected to become the dominant user.

To date, Wiggins Teape has licensed its stampable sheet technology to Nippon Steel, U.S. General Electric, and Ahlstrom OY of Finland.

New Developments from Japan

STABLE BINDER USABLE FOR CASTABLE REFRACTORY

Taki Chemical Co. has started marketing an inhouse-developed binder for castable refractories used for repairing broken refractory bricks. The new product is based on aluminium lactate and has a longer pot life (curing time) than those already in use. A longer pot life means improved workability.

As the temperature rises within the kiln to which a refractory containing the binder has been applied, the binder is sintered to a higher degree, thereby ensuring firm bonding. Even at a temperature below 1,000°C, it attains incomparable stability.

The company expects the new product to be increasingly applied to iron/steel furnaces, glass-melting pots and various types of kiln. It is producing the new binder at the rate of a few tonnes a month and supplying it to several major refractory makers.

It has commercialised for some time other types of binders for castable refractories: most of them are produced from aluminium hydrogen phosphate monobasic. They can be applied to neutral/alkaline (chromium and magnesium) refractories but are not suitable for basic ones containing silicic acid and silica.

When the temperature within a kiln reaches 800-1000°C, water retained in the cemented parts of the kiln begins to vaporise, thus weakening the bonding of refractories. The new product is expected to overcome such shortcomings seen in cement and other bonding materials.

NEW SYSTEM FOR IDENTIFYING BACTERIA IN FIVE HOURS BARED

Shimadzu Corp. has developed a new method of analysing bacterial DNA using gene-amplification technology and applied it to the development of a clinical test system designed to identify bacteria.

The method is intended to locate pathogenic bacteria by detecting the genes which control the pathogenicity concerned. Employed for the method are reagents capable of detecting specific DNAs contained in genes and attaching a fluorescent maker thereto.

The company has pioneered eight types of DNA reagents applicable to Vibrio parahaemolyticus, Staphylococcus aureus, Salmonella sp, Campyrobacter jejuni, Eschrichia coli: (heat-stable enterotoxigenic), Escherichia: (heat-labile enterotoxigenic), Closteridium perfrigens and Bacillus cereus.

It has also developed a pretreatment system for extracting DNA from samples, a DNA amplification system and a measuring system capable of detecting fluorescent makers incorporated in DNA.

It takes at least two to three days to identify bacteria using a conventional culture method. The new system is capable of detecting, for example, 100 types of pathogenic bacteria in only five hours.

The company claims it is useful for treating bacterial infectious diseases and preventing spread of pathogenic bacteria. It is scheduled to commercialise the promising system within two years.

MARKET INFORMATION

Polyvinyl Alcohol Up

Polyvinyl alcohol (No. 208) has risen by Rs. 30 per kg to Rs. 150 per kg following strong demand. Gohsenol GH-17 went up by Rs. 2 to Rs. 118 per kg. Shortage of styrene pushed up prices by Rs. 3 to Rs. 48 per kg. Phosphoric acid was short in supply due to irregular deliveries from one major manufacturer. Thiourea came down by Rs. 4 to Rs. 80 per kg following a glut situation in the market.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on March 7, 1990)

INDUSTRIAL CHEMICALS	Per Kg.				
Ammonium sulphate	2.50	Borax (Granular)	17.50	Cobalt oxide	300.00
Ammonium phosphate (Mono)	14.50	Borax (Powder)	22.00	Cresylic acid	62.00
Ammonium phosphate (Di)	14.50	Boric acid (Tech)	26.00	Camphor (Indian)	105.00
Ammonium carbonate (Di)	17.00	Bisphenol-A	75.00	Cream of Tartar (Tech.) China	70.00
Ammonium bicarbonate	6.00	Butyl carbitol	110.00	Citric acid (Belgium) (Resale)	47.00
Ammonium chloride	3.25	Caustic soda (Flakes)	12.50	Citric acid (Indian) (Resale)	44.00
Ammonium nitrate	6.00	Caustic soda (Solid)	12.00	Copper sulphate	26.00
Arsenic white powder	22+ST	Caustic soda (Lye)	10.00	Chromic acid	63.00
Acrylamide (Resale)	71.00	Calcium chloride 70% (Solid)	3.25	Ethylene urea	58.00
Barium carbonate	13.00	Calcium chloride 75-80%(fused)	3.50	Ferric chloride (Lumps)	5.50
Bleaching powder (33% Cl)	5.00	Calcium chloride 36% (Anhydrous)	5.00	Ferric chloride (Anhydrous)	16.00
		Calcium carbonate (precipitated)	6.00	Glue flakes	15.00
		Calcium carbonate (Activated)	5.75	Glue sheets	6.75
				Gohsenol GH-17	118.00
				Hydro	35+ST

Hyflosupercell	23.00
Hexamine (Resale)	34.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	39.00
Lithopone	19.00
Magnesium chloride (Crystal)	2.00
Menthol crystal (Flakes)	355+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	30.00
Magnesium carbonate (Indian)	26.00
Maleic Anhydride (Resale)	40.00
Mercury (34.5 Kgs)	11,500.00
Nickel chloride	110.00
Oxalic acid (Resale)	17.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	26.00
Potassium carbonate (Imported)	36.00
Potassium bichromate	33.00
Potassium phosphate (Mono)	34.00
Potassium phosphate (Di)	25.00
Polyvinyl alcohol (No. 117)	115.00
Polyvinyl alcohol (No. 173)	117.00
Polyvinyl alcohol (No. 208)	150.00
Paraformaldehyde (Resale)	25.00
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	49.00
Paraffin wax	19+ST
Rangolite (German)	96+ST
Rangolite (Czech.)	70.00
Sodium sulphate (Fine)	3.75
Sodium sulphate (Coarse)	3.90
Sodium sulphide 50-52% (Flakes)	11.50+ST
Sodium sulphide 58-60% (Flakes) (TCL)	25.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	840.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	4.90
Soda Ash (Birla)	4.30
Soda Ash (Imp.)	4.50
Sodium bicarbonate	6.00
Sodium bisulphite	8.00
Sodium silicate	5.50
Sodium acetate	7.20
Sodium alginate	420.00
Titanium Dioxide (Anatase)	80.00
Titanium Dioxide (Rutile – RCR_2)	118+ST
Tartaric acid	109.00
Trisodium phosphate	12.00
Thiourea	80.00
Urea (Tech.)	3.00
Vacuum salt	1.00
Zinc Dust	52.00
Zinc Oxide	57.00
Zinc chloride powder (Tech.)	20.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.00
Acetic Anhydride (Resale)	36.00
Acetone (Resale)	17.00
Adipic Acid	70.00
Aceto Acetanilide	55.00
Aniline Oil	49.00
Benzoate Plasticiser	62.00
Butyl acrylate	84+ST
Butyl stearate	38.00
Butanol	34.0
Benzyl Alcohol	60.0
Benzyl Chloride	34.0
Benzo trichloride	16.0
Benzoyl chloride	22.00
Bromine Liquid	65.0
Chloroform	27.0
Carbon Tetrachloride	19.5
Cellosolve	60.0
Cyclohexanone	57.0
Cyclohexanol	58+S
Diacetone (Resale)	27.50
Diethyl Oxalate	34.00
Diethyl glycol (DEG)	27+ST
Dioctyl Phthalate	44.0
Diallyl Phthalate	41.0
Dimethyl Phthalate	28.0
Dioctyl Adipate	52.0
Dibutyl Adipate	42.0
Dipentene	15.0
Dimethylamine 40%	52.00
Dimethylamine 50%	58.00
Ethyl Acetate	20.0
Ethyl Acrylate	72.0
Ethylene Dichloride	16.75
Ethylene Glycol	36.00
Formic Acid (Imp.)	23.00
Formaldehyde (Resale)	7.50
Glycerine (CP)	55.00
Glycerine (IW)	54.00
Hydrogen Peroxide 50% (Resale)	26.50
Isopropyl Alcohol	30.00
Isobutyl Alcohol (Resale)	35.0
Monoethanolamine (Resale)	90.0
Melamine	60.0
Methyl Ethyl Ketone	29.50
Methyl Isobutyl Ketone	38.00
Methyl Acrylate	66.0
Methylene Dichloride (Resale)	14.50

Carbitol	64+ST
Meta Cresol	45.00
Nitrobenzene	19.00
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	35.00
Propylene Glycol	50.00
Polyethylene Glycol (No.200)	58.00
Polyethylene Glycol (No.400)	65.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	80.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	48+ST
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	28.00
Triethanolamine (Resale)	88.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	50.00

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	12.50
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	11.00
Xylene	21.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	170.00
Aceto Acetic Ester (Methyl)	72.00
Ammonium Molybdate	210.00
Anthraquinone	145.00
Anthranilic Acid	78.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	350.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	95.00
Bromamine Acid	550.00
BON Acid	130+Ex+Ta
Chicago Acid (Atul)	355.00
Coach Acid	52.00
C. Acid (Imp.)	210.00
Cyanuric Chloride	150.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	75.00
Diethyl Aniline	160.00
Diamino stilbene disulphonic acid	168.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	205.00
H. Acid (Atul)	115.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	350.00
J. Acid Urea	410.00
K. Acid	125.00
MPDS (German)	185.00
MNA	
Meta Ureido Aniline	230.
MPD (Local)	205.
MPD (Japan)	240.
Naphthenic Acid	25.
N-Methyl J. Acid	580.
N-Methyl Aniline	125.
Naphthalene (Refined)	23.
Ortho Anisidine (OA) (Imp.)	108.
Ortho Dichloro Benzene (ODCB)	20.
OT Base	130.
Para Dichloro Benzene (PDCB)	32.
Para Anisidine (PA local)	160.
PNA	120.
Para Cresidine (Imp.)	410.
Para Amino Azo Benzene (India)	150.
PNCB	62.
Para Amino Acetanilide	190.
1-Phenyl 3-Methyl 5-Pyrazolone	140.0
Phenyl J. Acid	340.
Para Amino Benzoic Acid	165.
PT Base	140.
Rhoduline Acid	550.
Resist Salt 80%	28.
Resorcinol	190.
Sodium Naphthionate	67.
5-Sulpho-Anthranilic Acid	80.
Sulphanilic Acid	33.
Sulpho Tobias Acid	160.
Trichloro Benzene (TCB)	24.
Tobias Acid	166.
Metanilic Acid	43.0
MTD	120.0

Bombay Dyes Market

(Prices as on March 7, 1990)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175 85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50
Red 2B	422
Red FB	425
Red Violet FBL	622
Orange 3R	254
Violet 3R	370
Violet RL	355
Violet 6R	638.
Scarlet RR	283.
Rubine 3B	289.
Rubine CB	449.
Blue GL	419.
Blue BGF	805.
Navy Blue RE	359.
Brown 3REL	272.
Black GEL	420.
Dark Brown 3B	411.

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	586.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615 60

BASE COLOURS	Per K
Fast Yellow GC	77.
Fast Orange GC	128.
Fast Scarlet R	198.
Fast Scarlet RC	128.
Fast Scarlet RCR	105.
Fast Scarlet G	115.
Fast Scarlet GN	92.
Fast Scarlet GG	77.
Fast Scarlet GGS	73.
Fast Red B	233.
Fast Red RC	115.
Fast Red R Flakes	158.
Fast Red TR	181.
Fast Red TR Oil	223.
Fast Red RL	251.
Fast Red KB Oil	251.
Fast Bordeaux GP	236.
Fast Garnet GBC	103.
Fast Violet B	548.
Fast Blue BB	566.

NAPHTHOL COLOURS	Per K
ASG	301.
AS	205
ASSW	379
ASBS	253
ASBO	266
ASD	209
ASOL	243

ASTR	369.00
ASPH	336.05
ASE	236.00
ASEL	249.95
ASLB	2002.35
ASBT	2459.45
ASWG	143.00
ASSG	538.65
ASSR	652.60

PROCION COLOURS	Per Kg.
Golden Yellow HR	207.95
Brill. Yellow H4G	145.65
Supra Yellow H-8GP	168.55
Brill. Yellow HE6G	214.75
Yellow G-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	275.45
Yellow MGR	387.65
Brill. Yellow M4G	201.15
Brill. Yellow M8G	366.10
Yellow M3R	244.70
Brill. Orange H2R	303.80
rill. Red H7B	157.95
rill. Orange M2R	313.15
rill. Red H8B	213.55
rill. Scarlet H RN	245.05
pra Red H-3BP	179.80
rill. Red H-F3B	243.45
ill. Magenta HB	182.00
ill. Red M 5B	160.05
ill. Red M 8B	218.35
ill. Pink MB	137.10
ill. Magenta MB	163.65
ill. Purple H-3R	219.55
ill. Purple H-7R	175.40
vy Blue H 3R	333.75
l. Blue H-GR	406.40
il. Blue H5G	207.95
ie H 5RX	286.20
l. Blue H 7G	213.95
l. Blue H 7RX	358.15
quoise HA	265.05
pra Blue H-3RP	595.30
pra Turquoise H 2G P	181.50

Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	190.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: FEB. 23, (NNS) Phosphoric acid jumped up snarply by Rs. 600 at Rs. 1,900 per 50 kg. in the Delhi chemicals market during last week, in view of dwindling stock as well as increased demand. Tartaric acid France rose by Rs. 5 at Rs. 325 per kg owing to spurt in demand by cheese manufacturers as well as fall in import from France. In view of acute short supply, tartaric acid desi Swastik brand small quality was quoted at Rs. 210 per kg. Caustic soda flakes hardened by Rs. 5 at Rs. 515 in the absence of fresh arrivals.

As a result of increased demand from cold drink units, citric acid (Chinese) improved by Rs. 15 at Rs. 2,075 per 50 kg. Citric acid Bombay Dyeing held steady at Rs. 2,450 per 50 kg. Hydrogen peroxide moved up by 50/75 paise at Rs. 27.50/28 per kg in the wake of good offtake. Trisodium phosphate recorded a gain of Rs. 25 at Rs. 625 per 50 kg due to scanty supply.

Borax crystal went up sharply by Rs. 75 at Rs. 975 per 50 kg due to fall in fresh supply as well as shortage of stock. After an initial fall, prices of menthol flake, medium and bold quoted higher at Rs. 337, Rs. 380 and Rs. 400 per kg respectively, on account of keen demand by stockists and fall in inflow from U.P. Mentha oil remained static at Rs. 245/265 and DMO was quoted at Rs. 125 per kg.

Mercury suffered a setback of Rs. 200 at Rs. 11,000 per flask followed by lower advices from Bombay as well as poor enquiries by consumers. Chatkolite and sufolite eased by Re. 1 each at Rs. 52.50 and Rs. 65 per kg. As a result of slack demand from plastic and paint units, titanium dioxide anatase and RC-822 declined by Rs. 4/6 at Rs. 76 and Rs. 96 per kg. K-Brand titanium dioxide of Calcutta also drifted lower from Rs. 73 to Rs. 72 per kg.

No variation was noticed in the prices of dyes, colours and direct dyes in poor trading.

(DELHI MARKET RATES AS ON MARCH 2, 1990)

Ammonia Bicarb (Per 25 Kg.)	136.00
Mercury (Per flask)	11,000.00
Soda ash (Per bag)	340/357.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	515.00
Citric acid (Per 50 Kg.)	2,075/2,450.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCI (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	290/300.00
Sodium Hydrosulphite (Per Kg.)	34.00/36.50
Rangolite (Per Kg.)	83.00
Tartaric acid France (Per Kg.)	325.00
Sufolite (per Kg.)	65.00
Chatkolite (per Kg.)	53.50
DMO	125.00
Boric acid Technical (Per 50 Kg.)	1,325.00
Paraffin Wax (Per 50 Kg.)	875.00
Tartaric Acid (Swastik Per Kg.)	210.00
Borax Granular (Per 50 Kg.)	835.00
Borax Crystal (Per 50 Kg.)	975.00
Sodium Nitrite (Per 50 Kg.)	900/950.00
Sodium Nitrate (Per 50 Kg.)	440.00
Camphor Thai (Per Kg.)	104.00
Camphor Powder (Per Kg.)	96.00
Menthol Bold (Per Kg.)	400.00
Menthol Medium (Per Kg.)	380.00
Menthol Flake (Per Kg.)	337.[illegible]
Menthol Oil (Per Kg.)	245/265.[illegible]
Glycerine (Per Kg.)	55/58.[illegible]
Sodium Silicate (Per quintal)	275/350.[illegible]
Hexamine (Per Kg.)	34.[illegible]
Acetic Acid Glacial (Per Kg.)	15.[illegible]
Copper Sulphate (Per quintal)	2,400/2,7[illegible]
Formic Acid (Per Kg.)	23.[illegible]
Formaldehyde (Per Kg.)	8.[illegible]
Hydrogen Peroxide (Per Kg.)	26.75/27[illegible]
Calcium Carbonate (Per Tonne)	2,500/4,0[illegible]
Acid Slurry Soft (Per Kg.)	30[illegible]
Acid Slurry Hard (Per Kg.)	38[illegible]
Phosphoric Acid (Per 50 Kg.)	1,900[illegible]
Potassium Nitrate (Per quintal)	900/1,200[illegible]
Potassium Permanganate (Per 50 Kg.)	2,800/3,200[illegible]
Sodium Bichromate (Per 50 Kg.)	1,575/1,600[illegible]
Trisodium Phosphate (50 Kg.)	625[illegible]
Titanium Dioxide Anatase (Per Kg.)	76[illegible]
Titanium Dioxide RC-822 (Per Kg.)	10[illegible]
Titanium Dioxide K-Brand (Per Kg.)	73[illegible]
Titanium Dioxide RCR-2 (Per Kg.)	N[illegible]
Zinc Oxide (Per metric tonne)	42,000/48,00[illegible]
Phenol Carbolic Acid (Per Kg.)	37[illegible]
Carbon Tetrachloride (Per Kg.)	24[illegible]
Chloroform (Per Kg.)	28[illegible]
Sodium Sulphate (Per metric tonne)	3,400/3,60[illegible]
Naphthalene Balls (Per 50 Kg.)	1,40[illegible]

DYES & COLOURS	(Per [illegible]
Naphthol AS	175/20[illegible]
Naphthol ASG	180/29[illegible]
Naphthol ASBS	210/24[illegible]
Naphthol ASTR	275/36[illegible]
Naphthol ASOL	210/23[illegible]
Naphthol ASBO	195/26[illegible]

DIRECT DYES	(Per [illegible]
Black E. Conc.	120/17[illegible]
Diazo Black B.T.	105/14[illegible]
Green B	90/14[illegible]
Blue 2-B	60/10[illegible]
Blue 2-B 225% (JNR)	12[illegible]
Sky Blue FB	160/23[illegible]
Basic Auramine	55/11[illegible]
Basic Rhodamine	300/42[illegible]
Basic Methylene Blue	100/18[illegible]
Basic Violet	165/21[illegible]
Basic Malachite Green	17[illegible]
Acid Orange	75/1[illegible]
Congo Red H/C	75/12[illegible]

Madras Market

Markets were quite buoyant during the week. Caustic prices spurted to Rs. 570 to Rs. 580 per bag on reports of increase in prices at Bombay market. Tuticorin Alkali's continued closure of soda ash production due to non-availability of ammonia gas has resulted in increase in TAC's soda ash prices marginally though the other varieties are freely available. There has been spurt in the prices of phosphoric acid due to closure of Ballarpur Industries due to labour unrest. Under solvents section availability of acetone had further eased and the prices are coming down. Imported methanol from Kandla port is being offered at lower rates bringing the prices of methanol down.

(MADRAS MARKET RATES AS ON MARCH 3, 1990)

Acetic Acid Glacial (per kg)	15.00
Aluminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	150.00
Ammonium Chloride (per MT)	3,000.00
Acid Slurry (per kg)	31.00
Barium Carbonate (per kg)	9.00
Barium Chloride (per kg)	8.00
Boric Acid Technical (per kg)	24.00
Bleaching Powder (per 50 kgs)	220.00
Borax (per 50 kgs)	760.00
Caustic Soda Flakes – Mettur Chemicals (per MT)	11,400.00
Caustic Soda Flakes – Andhra Sugars (per MT)	11,400.00
Calcium Chloride 70% Solid (per MT)	3,000.00
Calcium Chloride Anhydrous (per MT)	5,750.00
Calcium Carbonate (Activated) (per MT)	6,000.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	130.00
Pure Para Cresol 96% (per kg)	85.00
Meta Para Cresol 42% (per kg)	50.00
Formic Acid (per kg)	26.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	50.00
Hydrosulphite of Soda (TCPL) (per kg)	38.50
Hydrosulphite of Soda (IDI) (per kg)	42.00
Hydrosulphite of Soda (BASF) (per kg)	42.00
Hexamine (per kg)	31.00
Hyflosupercell (per kg)	19.00
Hydrogen Peroxide (per kg)	31.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	38.00
Magnesium Carbonate (per kg)	18.00
Magnesium Chloride (per kg)	[illegible]
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	345.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	17.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	26.00
Polyvinyl Alcohol Powder (per kg)	125.00
Pentaerythritol (per kg)	50.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	395.00
Soda Ash (TATA) (per 75 kgs)	375.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	16.00
Sodium Sulphide Flakes (per kg)	14.00
Sodium Bisulphite (per kg)	8.00
Sodium Alginate (per kg)	280.00
Sodium Acetate (per kg)	7.00
Sodium Sulphate (Anhydrous) (per kg)	3.60
Titanium Dioxide (Anatase) (per kg)	75.00
Titanium Dioxide (Rutile) (per kg)	90.00
Trisodium Phosphate (per kg)	12.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	50.00
Zinc Chloride Powder (per kg)	12.50
Zinc Sulphate (per kg)	8.00

SOLVENTS

Acetone -- HOCL (per kg)	18.50
Butanol (per kg)	36.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	14.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	20.00
Chloroform (per kg)	29.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	35.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	45.00
Di-N-butyl Phthalate (per kg)	45.00
Ethyl Acetate (per kg)	21.00
Isopropyl Alcohol (per kg)	29.00
Methanol (per kg)	9.00
Methylene Chloride (per kg)	20.00
Methyl Ethyl Ketone (per kg)	32.00
Methyl Isobutyl Ketone (per kg)	38.00
Phenol (per kg)	38.00
Sorbitol (per kg)	13.00
Triethanolamine (per kg)	95.00
Trichloroethylene (per kg)	25.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	15.00
Xylene (per lit)	20.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx. sailing dt. (5)
6/3	Moscenice (Yug)	Oceanic	Hodeidah; Jeddah; P. Said; Rijeka.	14/3
14/3	Kapitan Kud (Rus)	Transocean/	Tilbury; Avonmouth; Liverpool; Manchester; London; Felixstowe; Birmingham; Antwerp; (Rotterdam); Hamburg; Bremen; Copenhagen; Gothenburg; Oslo; Stockholm; Malmao; Leeds. (Carting at TP No. 3).	17/3
		I.S.S.Co.	Felixstowe; Tilbury; Antwerp; Rotterdam; Hamburg; Bremerhaven & Scandinavian Ports via Hamburg. (Carting at E-Grain Depot).	
11/3	Finnwood (Fin) (TBR Lanka Abhaya)	Seahorse	Hodeidah; Jeddah; Aqaba (Direct); Felixstowe; London; Liverpool; Manchester; Avonmouth; Dublin; Glasgow; Wembly; Liecester; Immingham; Birmingham; Leeds; Antwerp; Bremen; Copenhagen; Gothenburg; Hamburg; Rotterdam; Oslo; Stockholm; Helsinki; Aarhus; Malmao; Norkopping. (Carting at M.O.D. No. 3).	15/3
16/3	CMB Marque (Nhava Sheva)	C.M.B.	Djibouti; Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Carting at Kalamboli).	18/3
11/3	Eagle Nova	F.F.C. Co.	Jeddah; P. Sudan; Hodeidah. (Carting at Timber Pond No. 1).	16/3
12/3	Paithoon	Kanika	Antwerp; Rottrerdam; Hamburg; Le Havre; Genoa; Gothenburg; Stockholm; Copenhagen; Oslo; Helsinki; London; Felixstowe; Tilbury. (Carting at T.P. No. 3).	17/3
12/3	Seacrest Achiever (Ger) (V-209)	Merzario	Jeddah; Hodeidah; P. Sudan; Ravenna; Ancona; Piraeus; Venice; Trieste. (Carting at M.O.D. No. 1).	17/3
		Seaspeed/	Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Scandinavian Ports. (Carting at M-176 Cotton Depot).	
		L. Triest/	Jeddah; Trieste; Venice; Ravenna; Rijeka; Naples. (Carting at M-171/173 (Cotton Depot).	
		Oceanic/	P. Said; Limassol; Alexandria; Casablanca; Tripoli; Livorno; Genoa; Mersin; Iskendren; Izmir. (Carting at Wadi Bunder No. 3).	
		Killick	Jeddah; Felixstowe; London; Liverpool; Manchester; Bristol; Avonmouth; Leeds; Glasgow; Tilbury; Birmingham; Dublin; Belfast; Rotterdam; Hamburg; Le Havre; Antwerp; Bremen; Bremerhaven; Fos; Valencia; Marseilles; Barcelona and Scandinavian Ports. (Carting at E-Shed Grain Depot).	
12/3	Orient Express (Pan) (V-111)	Transworld/	Hodeidah; Djibouti; Port Sudan; Jeddah; Assab; Masawa; La Spezia; Naples; Malta; Beirut; Tartous; Mersin; Marseilles; Genoa; Valencia; Fos; Leghorn; Tilbury; London; Liverpool; Avonmouth; Birmingham; Manchester; Leeds; Dublin; Belfast; Antwerp; Hamburg; Bremen; Rotterdam; Le Havre; Aarhus; Gothenburg; Helsinburg. (Carting at CFS Cotton Avenue).	15/3
14/3	Medipas Wave	L. Triest/	Jeddah; Barcelona; Marseilles; Genoa; Leghorn; La Spezia; Naples with TP Trieste; Venice; Ravenna; Bari; Koper; Rijeka; Las Palmas; Santacruz; De Teneriffe; Malta; Limassol; Alexandria; Casablanca; Tunis; Algiers; Lattakia; Tripoli; Benghazi; Oran; Point E Pitre; Port De France. (Carting at M-171/173 Cotton Depot).	18/3
		Samrat/ Hindustan/	Barcelona; Marseilles; La Spezia; Livorno; (Leghorn); Genoa; Naples and other Italian ports and FCL only Beirut; Alexandria; Valletta; Lattakia; Mersin. (Carting at Mallet Bunder for both).	
		Merzario	Genoa; Leghorn; La Spezia; Naples; Salerno; Marseilles; Barcelona. (Carting at M.O.D. No. 1).	
4/3	Al Foudia	Samarth	Jeddah; P. Sudan; Aden; Aqaba.	20/3
3/3	CGM Roussillon	Patvolk/ S.W. & Co. Trident/ P&O	Tilbury; London; Felixstowe; Avonmouth; Manchester; Liverpool; Glasgow; Leeds; Birmingham; Dublin; Belfast; Bristol; Marseilles; Genoa; Barcelona; Le Havre; Antwerp; Rotterdam; Hamburg; Bremerhaven; Copenhagen; Oslo; Helsinki; Malmao; Gothenburg; Stockholm; Aarhus; Alborg. (Carting at Kalamboli for all).	15/3

(1)	(2)	(3)	(4)	(5)
[illegible]	Ocean Sincerity	O.S.A	Sydney; Melbourne; Adelaide; Brisbane; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting at M-178/180 Cotton Depot).	[illegible]/3
[illegible]	Banglar Robi	Sai Ship	Dubai. (Carting at E. Grain Depot).	1[illegible]/3
[illegible]	Al Karim	Samarth	Dubai; Dammam; Kuwait; Bahrain.	13/3
[illegible]	Rossana (Voy-41W)	Mackintosh	Dubai; Muscat.	17/3
[illegible]	Al Zahraa (Iraqi)	Al Rafidain	Umm Qaser.	17/3
1[illegible]/3	Brixham 1	Parekh	Salallah; Dubai	16/3
1[illegible]/3	Eagle Nova (V-10)	F.F.C. Co.	Dubai; Sharjah; Abu Dhabi; Doha; Muscat; Dammam; Riyadh; Bahrain; Kuwait. (Carting at Timber Pond No. 1).	16/3
11/3	Finnwood	Seahorse	Dubai; Khorfakkan; Sharjah; Muscat; Dammam; Riyadh; Kuwait. (Carting at M.O.D. No. 3).	15/3
12/3	Seacrest Achiever (Voy-209)	Parekh/	Muscat; Dubai, Sharjah; Abu Dhabi; Bahrain; Dammam; Kuwait; Baghdad. (Carting at Timber Pond No. 3).	17/3
		Merzario/	Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Dammam; Kuwait; Bahrain. (Carting at M.O.D. No. 1 for Merzario).	
		L. Triest/	Dubai; Dammam; Riyadh; Muscat; Abu Dhabi; Doha; Kuwait; Bahrain. (Carting at 171/173 Cotton Depot).	
		Seaspeed/	Dubai; Dammam; Bahrain; Kuwait; Doha. (Carting at AM-176 C.D.).	
		Killick/	Dubai; Dammam; Riyadh; Bahrain; Kuwait. (Carting at E-Shed Grain Depot).	
		O.S.A.	Dubai; Abu Dhabi; Bahrain; Doha; Muscat; Kuwait; Dammam. (Carting at M-178/180 Cotton Depot).	
		Kanika/	Dubai; Abu Dhabi; Sharjah; Muscat; Kuwait; Bahrain. (Carting at T.P. No. 3).	
		Sai Ship	Dubai; Muscat; Sharjah; Abu Dhabi. (Carting at E. Grain Depot).	
12/3	Orient Express (V-111) (Pan)	Transworld/	Sharjah; Dubai; Abu Dhabi; Fujairah; Ajman; Doha; Kuwait; Dammam; Baghdad/Basrah and inland destinations in Gulf. (Carting at CFS Cotton Avenue).	15/3
		Sai Ship	Dubai; Muscat; Sharjah; Abu Dhabi. (Carting at E. Grain Depot).	
		Worldwide	Dubai; Muscat; Baghdad; Sharjah; Abu Dhabi; Basrah.	
13/3	Balqees (Iraqi)	Al Rafidain	Umm Qaser.	21/3
11/3	Eagle Nova (V-10)	F.F.C. Co.	Los Angeles (Harbour); Longbeach; San Francisco; Oakland; Seattle; Vancouver (B.C.); Portland; New York; Boston; Norfolk; Baltimore; Charleston; Savannah; Miami; New Orleans; Houston; Montreal; Toronto; Fortworth; Chicago; Nashville; Atlanta; Philadelphia; Milwaukee; Kansas City; Phoenix; Guam; Dallas; Cleveland; St. Louis; Cincinnati; Denver; Louisville; Memphis; Wilmington; (B.C.); San Diego; Minneapolis; Indianapolis and Central American Ports; Honolulu. (Carting at Timber Pond No. 1).	16/3
13/3	CGM Roussillon (Nhava Sheva)	Patvolk/P&O/ S.W. & Co.	S. American ports. (Carting at Kalamboli for all).	15/3
12/3	Seacrest Achiever (V-209)	Seaspeed	New York; Baltimore; Norfolk; Savannah; Charleston; Houston & S. America ports. (Carting at M-176 Cotton Depot).	17/3
12/3	Paithoon (V-33) (Thai)	Samrat/	Longbeach; Oakland; Seattle; Los Angeles; San Francisco; Philadelphia; Savannah; Charleston; Baltimore; Norfolk; New York; Boston; St. John; Vancouver; Montreal; Toronto; New Orleans; Houston. (Carting at M.B.).	17/3
		U.L.A.	Los Angeles; San Francisco; Oakland; Seattle; Vancouver; Charleston; Houston; Norfolk; Baltimore; New York; Halifax; Montreal; Toronto; West Indies ports. (Carting at M-171/173 Cotton Depot).	
		E.S.P.L./	Longbeach; Charleston; New York; St. John; Norfolk; Oakland; Vancouver (B.C.); Seattle; Montreal; Baltimore; Boston; Chicago; Dallas; Houston; Longview; Los Angeles; New Orleans; Philadelphia; Portland; San Diego; Mexico City; San Francisco; Siouxfall; Sacramento; Stockton; Halifax; Toronto; Savannah; Taoma; Miami and all other destinations. Also Caribbean ports. (Carting at M-172 Cotton Depot)	
		Trident/	S. American; Caribbean & Central American ports. (Crtg. at TP No. 4).	
		Arebee	S. American ports. (Carting at M. Jetha Cotton Depot).	
14/3	Kapitan Kud	Marathon	Boston; New York; Baltimore; Norfolk. (Carting at T.P. No. 3).	17/3

(1)	(2)	(3)	(4)	(5)
20/3	Stonewall Jackson	M.S.P.L.	Aqaba; Assab; P. Suez; (Alexandria). (Carting at P/Q-PD).	20/3
11/3	Finnwood	Seahorse	Colombo. (Carting at M.O.D. No. 3).	15/3
12/3	Paithoen	Silvership	Chittagong. (Carting at Timber Pond No. 3).	17/3
11/3	Eagle Nova	F.F.C. Co.	Colombo; Rangoon. (Carting at Timber Pond No. 1).	16/3
12/3	Banglar Mita	Silvership	Chittagong	17/3
14/3	Medipas Wave	L. Triest	Colombo. (Carting at M-171/173 Cotton Depot).	18/3
11/3	Eagle Nova (V-10) (Cyp)	F.F.C. Co.	Penang; P. Kelang; Singapore; Bangkok; Jakarta; (T. Priok); Hongkong; Manila; Busan; Keelung; Kaohsiung; Kobe; Yokohama; Nagoya; Osaka; Tokyo; Tsingtao; Dairen; Quangzhou; Whampoa; Shanghai; Hsingkang. (Carting at Timber Pond No.1).	16/3
13/3	Y. Yaroslavskiy	Transocean	Singapore; Main Japan ports.	21/3
8/3	Kranj (Yug)	Depe	Hongkong; Keelung; Kaohsiung; Kobe; Yokohama; Busan. (Carting at CFS Cotton Avenue for Containers only).	17/3
11/3	Finwood	Seahorse	Singapore; Penang; P. Kelang; Bangkok; Hongkong; Keelung; Kobe; Yokohama and FCL only Busan; Inchon; Osaka; Tokyo; Nagoya; Kaohsiung. (Carting at M.O.D. No. 3).	15/3
12/3	Paithoon (V-33)(Thai)	Samrat/	Singapore (Direct); Penang; Jakarta; Surabaya; Belawan; P. Kelang; Bangkok; Manila; Hongkong; Kaohsiung; Keelung; Taichung; Busan; Yokohama; Nagoya; Kobe; Osaka; Tokyo. (Carting at Mallet Bunder).	17/3
		Trident/	Busan; Hongkong; Keelung; Kobe; Nagoya; Yokohama; Penang; P. Kelang; Bangkok; Kaohsiung; Singapore. (Carting at T.P. No. 4).	
		U.L.A./	Singapore; Penang; P. Kelang; Keelung; Kaohsiung; Bangkok; Busan; Jakarta; Hongkong; Japan and Chinese ports. (Carting at M-171/173 Cotton Depot).	
		E.S.P.L./	Singapore; Hongkong; Bangkok; Jakarta; Kaohsiung; Keelung; Penang; P. Kelang; Kota Kinabulu; Kulaubelati; Bintulu; Kuching; Labuan; Vietnam (P.R.C.). (Carting at M-172 Cotton Depot).	
		I.M.E./	Singapore; Bangkok; Hongkong; Keelung; Busan; Kobe; Yokohama; Nagoya. (Carting at Wadi Bunder No. 3).	
		M.C.S./	Singapore; Hongkong; Keelung; Kaohsiung; Jakarta; Surabaya; Bangkok; Penang; P. Kelang. (Carting at E-Grain Depot).	
		Kanika/	Bangkok; P. Kelang; Djakarta; Keelung; Busan; Hongkong. (Carting at T.P. No. 3).	
		Silver Ship	Singapore; Far East & Japan ports. (Carting at T.P. No. 3).	
12/3	Orient Express (V-111)	Transworld/	P. Kelang; Penang; Keelung; Kaohsiung; Busan; Bangkok; Kobe; Manila; Djakarta. (Carting at C.F.S. Cotton Avenue).	15/3
		N.L.S.	Far East; Japan & Chinese ports. (Carting at T.P. No. 4).	
15/3	Ocean Sincerity (V-21A/B) (Lib)	O.S.A./	P. Kelang; Singapore; Kaohsiung; Hongkong; Bangkok; Kobe; Yokohama; Nagoya; Moji; Osaka; Busan; Tokyo; Simizu; Keelung; Tsingtao; Quindao; Xianging; Shanghai. (Carting at M-178/180 C.D.).	20/3
		M.S.P.L.	Singapore; Bangkok; P. Kelaung; Penang; Jakarta; Manila. (Carting at E-Grain Depot).	
20/3	Stonewall Jackson	M.S.P.L.	Singapore. (Carting at P/Q-PD)	20/3
11/3	Finnwood	Seahorse	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Carting at M.O.D. No. 3).	15/3
11/3	Eagle Nova	F.F.C. Co.	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Carting at T.P. No. 1).	16/3
12/3	Paithoon (V-33)	Samrat/	Brisbane; Sydney; Melbourne; Adelaide; Fremantle; Burnie. (Carting at M.B.).	17/3
		Trident/	Brisbane; Sydney; Melbourne; Adelaide; Fremantle; Burnie; Auckland; Wellington; Lyttelton. (Carting at T.P. No. 4)	
		Arebee/	Sydney; Melbourne; Adelaide; Brisbane. (Carting at M-Jetha C.D.)	
		Transworld/	Sydney; Melbourne; Adelaide; Fremantle; Burnie; Brisbane. (Carting at CFS Cotton Avenue).	
		Kanika/	Brisbane; Sydney; Melbourne; New Castle; Adelaide; Fremantle; Auckland; Wellington; Lyttleton. (Carting at Timber Pond No. 3).	
		Silvership/	Sydney; Melbourne; Brisbane; Adelaide; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting at T.P. No. 3).	
		I.M.E.	Sydney; Melbourne; Adelaide; Fremantle; Brisbane; Auckland; Wellington; Lyttelton. (Carting at Wadi Bunder No. 3).	

(1)	(2)	(3)	(4)	(5)
11/3	Finnwood	Seahorse	New York; Baltimore; Charleston; Norfolk. (Carting at M.O.D. No. 3).	15/3
16/3	CMB Marque (Nhava Sheva)	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans; Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli).	18/3
12/3	Orient Express (Voy-111)	Transworld	Los Angeles; Longbeach; San Francisco; Oakland; Seattle; Vancouver; New York; Boston; Toronto; Montreal; Philadelphia; Norfolk; Baltimore; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston. (Carting at CFS Cotton Avenue).	15/3
14/3	Medipas Wave	Samrat/ Hindustan/ L. Triest	Boston; New York; Baltimore; Norfolk; Charleston; P. Mouth; P. Lauderdale; Miami; New Orleans; Savannah; Jacksonville; P. Everglades; Philadelphia; Halifax; Montreal; Toronto and S. American ports. (Carting at M-171/173 Cotton Depot for L. Triest) (Carting at Mallet Bunder for Hindustan & Samrat).	18/3
15/3	Ocean Sincerity (V-21A/B)	O.S.A.	New York; Baltimore; Philadelphia; Houston; Boston; Chicago; Dallas; Atlanta; Savannah; Norfolk; Charleston; Los Angeles; San Francisco; Oakland; Seattle; Vancouver; Toronto; Montreal; Portland; Tacoma; & S. American & West Indies ports. (Carting at M-178/180 C.D.).	20/3
20/3	Stonewall Jackson (Ame)	M.S.P.L.	Philadelphia; Baltimore; Norfolk; New Orleans; Houston; Savannah; New York. (Carting at P/Q-PD).	20/3
13/3	CGM Roussillon (Nhava Sheva)	Patvolk/P&O/ S.W. & Co.	West African ports. (Carting at Kalamboli for all)	15/3
12/3	Seacrest Achiever	Seaspeed	West African ports. (Carting at M-178 Cotton Depot).	17/3
12/3	Paithoon	U.L.A./ Trident	Lagos/Apapa; Abidjan; Lome/Matadi. (Carting at M-171/173 C.D.). Tema/Lome; Lagos; Matadi; Lobitol; Luanda; Freetown; Cotonou; Douala; P. Harcourt; Abidjan; Monrovia; Dakar. (Carting at T.P. No. 4).	17/3
16/3	CMB Marque (Nhava Sheva)	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema Via Antwerp. (Carting at Kalamboli).	18/3
12/3	Orient Express (V-111)	Transworld	Monrovia; Lome; Lagos; Douala; Tema; Takoradi; Abidjan; San Pedro; (Carting at CFS Cotton Avenue).	15/3
14/3	Medipas Wave	L. Triest	With T.P. Lagos/Apapa; Abidjan; Dakar; Douala; Cotonou; Nouakchott; Libreville; Tema; Matadi; Conakry; Freetown. (Carting at 171/173 Cotton Depot).	18/3
8/3	Banglar Robi	Sai Ship	Mogadiscio; Mombasa; Dar Es Salaam; Beira; Zanzibar. (Carting at E-Grain Depot).	15/3
16/3	CMB Marque (Nhava Sheva)	C.M.B.	Dar Es Salaam; Mombasa (Direct); Nacala; Tanga; Kampala; Blantyre; Lusaka; Ndola; Matwara; Lilongwe and all Inland Destinations in East Africa. (Carting at Kalamboli).	18/3

VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Seamer's Name	Agents	From
16/3	CMB Marque (Nhava Sheva)	C.M.B.	U.K. Cont./U.S./Med./E. Africa
18/3	Hoegh Clipper	Patvolk	U.S.A.
20/3	Hallborg	Sai Ship	Brazil
14/3	Kapitan Kud	Transocean	U.K. Cont.
15/3	Kota Salam	Mackintosh	Far East
14/3	Medipas Wave	L. Triest/Hindustan	Med. Ports.
16/3	Mikhail Vladimirskiy	Transocean	Far East
15/3	Ocean Sincerity (V-21A/B)	O.S.A./ M.S.P.L.	F. East/U.S. Far East
17/3	Oyster Bay	P & O	E. Africa
15/3	Olandia (V-02)	Merzario/Samrat	U.K. Cont.
20/3	Stonewell Jackson	M.S.P.L.	U.S.A.
15/3	Vishva Shoba	S.C.I.	Med. Ports.

Materials Imported

MATERIALS IMPORTED
BOMBAY
(From 11.1.90 to 15.1.90)
(Continued from previous issue)

PHTHALO DINITRILE: From RG: Hindustan Ciba Geigy Ltd., 1,500 gs., Rs. 1,32,291.

GAMMA PICOLINE: From Japan: ajshi Chemical & Products, 4.944 Ts., Rs. 2,44,561.

POLYVINYL ALCOHOL: From aiwan: Bombay Dyeing & Manufacuring Company Limited, 3 Kgs., s. 1,18,622.

POLYVINYL PYRROLIDONE: rom FRG: Parke Davis Ltd., 150 Kgs., s. 35,468.

PROPYLENE GLYCOL: From SA: Parikh Chemical Inds., 12.9 Ts., Rs. 2,49,491.

PROPYLENE GLYCOL USP: From SA: S. Kushalchand & Co., 33,540 gs., Rs. 6,63,093.

SODIUM CHLORITE: From FRG: elcro India Limited, NA, Rs. 40,987.

SODIUM HYDRIDE 80%: From G: Ranbaxy Labs. Ltd., 1,000 Kgs., s. 3,20,824.

SODIUM PERBORATE: From pan: Akay Cosmetics Private Limited, 678 Kgs. Rs. 36,875.

SODIUM PETROLEUM SULPHONATE: From Netherlands: Lubrizol India Ltd., 2,551 Kgs., Rs. 5,15,135.

SOYALECITHIN: From FRG: Coates of India Ltd., 2,000 Kgs., Rs. 36,433.

L(-) TARTARIC ACID BP/USP: From Argentina: Cadila Laboratories Ltd., 18,000 Kgs., Rs. 9,72,289.

THIOUREA: From Japan: Sudarshan Chemical Inds., NA, Rs. 36,542.

TITANIUM DIOXIDE: From USA: Asian Paints India Ltd., 13,500 Kgs., Rs. 59,41,379; Coromandel Paints & Chemical, 11,425 Kgs., Rs. 5,85,853; Jain Plastics & Chemicals Pvt. Ltd., 18.1438 MTs., Rs. 5,94,294; Singhania Bros., 6.1444 MTs., Rs. 2,93,443; K. Uttamlal Export, 9,070 Kgs., Rs. 5,06,382.

TRICHLOROETHYLENE: From Japan: Jadavji & Co., 8,400 Kgs., Rs. 83,172.

TRICHLOROETHYLENE GLYCOL: From Japan: Hico Products Ltd., 12,150 Kgs., Rs. 3,34,203.

TRIMELLITIC ANHYDRIDE: From USA: Twin Hill Paints, 2,250 Lbs., Rs. 45,698.

3,4,5 TRIMETHOXY BENZALDEHYDE: From France: Pragati Pharmaceuticals Private Limited, 200 Kgs., Rs. 80,800.

2,6 XYLIDINE: From Switzerland: Jai Pvt. Ltd., 2,000 Kgs., Rs. 2,69,924.

PLASTIC MATERIALS
IMPORTED
BOMBAY
(From 11.1.90 to 15.1.90)

HDPE: From Japan: Borana Plastics, 25 MTs., Rs. 3,30,660; Neo Sack Ltd., 25 MTs., Rs. 3,27,999; RCF Ltd., 2,000 Kgs., Rs. 2,62,012; From Saudi Arabia: Daniel Philips & Co. P. Ltd., 51,450 Kgs., Rs. 6,32,418; Nidhi Plastics Ltd., 16.5 MTs., Rs. 1,64,056; Nipa Electroplast P. Ltd., 17.15 MTs., Rs. 2,09,333; The Supreme Inds. Ltd., 68.60 MTs., Rs. 8,84,502; From USA: Naresh Traders, 12.5 MTs., Rs. 1,07,944; Vishal Plastic Inds., 17.5 MTs., Rs. 1,92,545; From Yugoslavia: Pratik Overseas Corpn., 9 Kgs., Rs. 1,19,757.

LDPE: From Korea: S.R. Traders, 60 MTs., Rs. 7,58,268; From Saudi Arabia: Plastic Processor, 82.5 MTs., Rs. 9,07,710; From UAE: Bajaj Plastics Ltd., 16.5 MTs., Rs. 2,41,111; From USA: ABC Corpn., 17,000 Kgs., Rs. 18,78,082.

LLDPE: From Saudi Arabia: Amar Plastics, 198 MTs., Rs. 21,61,476; Ketan Plastics Pvt. Ltd., 16.5 MTs.,

Rs. 1,84,379; Leela Packaging P. Ltd., 49.5 MTs., Rs. 4,97,823; Shrikant Plastic Inds., 33,000 Kgs., Rs. 3,64,569; The Supreme Inds. Ltd., 49.5 MTs., Rs. 5,40,371; Vee Pee & Associates P. Ltd., 16.5 MTs., Rs. 1,84,379.

PTFE RESIN: From Italy: Mechanical Pkg. Ind. Ltd., 5 Kgs., Rs. 1,18,621.

PVC RESIN: From France: Inarco Ltd., 17 MTs., Rs. 2,45,596; From FRG: Lucky Plast Ltd., 12.25 MTs., Rs. 2,79,309; From Korea: Caprihans India Ltd., 2,00,000 Kgs., Rs. 27,95,514; From Mexico: AMC Coated Fabrics P. Ltd., 26 MTs., Rs. 4,79,517; From Saudi Arabia: Jain Accessories & Fittings, 577.5 MTs., Rs. 66,51,817; Jain Compounding and Form Pvt. Ltd., 478.5 MTs., Rs. 55,11,515; Jee PVC Pipes P. Ltd., NA, Rs. 72,21,973; From USA: Aarbee Pipes Profiles P. Ltd., 480.72 MTs., Rs. 51,88,217; Sun Export Corpn., 199.25 MTs., Rs. 32,70,764; The Supreme Inds. Ltd., 40 MTs., Rs. 42,29,688.

PERCHLOROETHYLENE: From Italy: Rajasthani Trading Co., 18,480 Kgs., Rs. 1,48,587.

POLYETHYLENE: From Belgium: Cable Corpn. of India Ltd., 12,000 Kgs., Rs. 5,08,222.

POLYPROPYLENE: From Belgium: Gujarat Propack Ltd., 15,000 Kgs., Rs. 2,09,053; From FRG: Amit Castings P. Ltd., 699.45 Kgs., Rs. 1,44,210; From UK: Siddartha Plastics, 48 MTs., Rs. 6,43,650; From USA: Garware Wall Ropes Ltd., 26,436 Kgs., Rs. 31,48,910; Ottajee Plastics, 17.5 MTs., Rs. 2,58,264; Roshma Poly Pack, 16.5 MTs., Rs. 2,34,719.

POLYSTYRENE: From Korea: Chawla Enterprises P. Ltd., 17 MTs., Rs. 2,59,711; Ganpati Properties Ltd., 17 MTs., Rs. 12,56,790; H. Jitendra Kumar & Co., 17 MTs., Rs. 2,60,107; Jamnadas Murlidhar Jaisingh, 102 MTs., Rs. 14,72,966; Ramesh Plastics Inds., 1,700 Kgs., Rs. 2,57,153; Ri Star Plastics Pvt. Ltd., 50 M Rs. 7,26,590; Transworld Export Imports, 17 MTs., Rs. 2,53,431; Un Plastic Ind. P. Ltd., 70 M Rs. 9,92,223; Vinjeep Enterprises MTs., Rs. 3,63,193.

STYRENE: From FRG: Shree V katesh Chemi-colour, 300 K Rs. 1,03,727; From USA: Shilpa In national, 17.2 MTs., Rs. 2,63,101.

DRUG MATERIALS IMPORT BOMBAY (From 11.1.90 to 15.1.90)

D-CALCIUM PANTOTHEN USP: From Japan: Dilipkumar and 300 Kgs., Rs. 64,984.

INDOMETHACIN BP 80: F China: Malav Agency, 275 K Rs. 1,35,545.

PSEUDO EPHEDRINE HCL From Hong Kong: Sol Pharmls. P. 200 Kgs., Rs. 2,44,745.

PYRIMETHAMINE BP: F China: Nidhi Pharma Chem, 200 K Rs. 72,923.

DYE MATERIALS IMPORT BOMBAY (From 11.1.90 to 15.1.90)

DYES: From China: Blue Dyestuff Inds., 1,100 Kgs., Rs. 58, From FRG: Vardhman Spinnin Gen. Mills Ltd., 150 Kgs., Rs. 45.

MAATERIALS IMPORTE MADRAS (From 20.12.89 to 30.12.89)

ACETONE: From China: Pra Drug Co., 12,800 Kgs., Rs. 1,66,

ACETONITRILE: From C National Org. Chem. Inds. Ltd., 2 Kgs., Rs. 6,09,683.

ACETYL CHLORIDE: From gapore: Shasun Drugs, 7,980 Rs. 2,18,716.

N-ACETYL SULPHANILYL HLORIDE: From Japan: Arandy aboratories Ltd., 20 MTs., Rs. 10,97,595; Standard Organics Ltd., 0 MTs., Rs. 9,90,369.

AEROSIL: From FRG: Varnam rinting Inks P. Ltd., 250 Kgs., Rs. 37,746.

L-ALANINE: From Japan: Dr. Reddy's Laboratories Ltd., 50 Kgs., Rs. 3,66,032.

ALLYL CAPROATE ETHYL IEXANOATE: From UK: The Flaours India Pvt. Ltd., 100 Kgs., Rs. 21,515.

D-ALPHA PHENYL GLYCINE CHLORIDE: From Italy: Benzex Labs Ltd., 1,995 Kgs., Rs. 7,74,674; 1,050 Kgs., Rs. 4,58,737.

AMMONIUM PENTABORATE: rom Japan: Elcot New Era Technolgies Ltd., 100 Kgs., Rs. 12,182.

ANTIMONY OXIDE: From Japan: enner India Ltd., 10,000 Kgs., Rs. 5,04,566.

AROMATIC CHEMICALS: From RG: Dinamit Enterprises, 100 Kgs., Rs. 4,988; From Switzerland: Bush Boake Allen (I) Ltd., 40 Kgs., Rs. 39,059.

TETRABROMO BISPHENOL A: rom Netherlands: SIP Resins Ltd., ,000 Kgs., Rs. 2,63,383.

PARA TERTIARY BUTYL BENOIC ACID: From Japan: Addison aints & Chemicals Ltd., 3 MTs., s. 1,68,327.

BUTYL GLYCIDYL ETHER: From apan: SIP Resins Ltd., 1,080 Kgs., s. 73,162.

N-BUTYL METHACRYLATE: rom Japan: Addison Paints and Chemcals Ltd., 2,160 Kgs., Rs. 86,591.

BUTYL STEARATE: From Japan: K. Magnetics, 450 Kgs., Rs. 28,055.

CAPROLACTAM: From Netherlands: Shriram Fibres Ltd., 2,72,000 gs., Rs. 80,61,362.

CARBON BLACK: From Korea: MRF Ltd., 7,340 Kgs., Rs. 23,67,950.

CHLOROMEZANONE: From China: Chemech Laboratories Ltd., 20 Kgs., Rs. 17,520.

CHLOROPYRIDINE: From FRG: Venkatrama Chemicals Ltd., 2,400 Kgs., Rs. 5,51,154.

CINNAMYL ALCOHOL: From UK: N. Ranga Rao and Sons, 980 Kgs., Rs. 1,68,981.

DIETHYLENE GLYCOL: From FRG: Chemidye Mfg. Co. Pvt. Ltd., 18,800 Kgs., Rs. 2,09,501.

DIMER ACID: From USA: Gayatri Chemicals & Coating Pro., 2,858 Kgs., Rs. 64,550.

ETHOXY CARBONYL PROPIONYL CHLORIDE: From USA: Pradeep Drug Co., 216 Kgs., Rs. 87,794.

ETHYL HEXYL CHLOROFORMATE: From France: Peroxides India Ltd., 4,140 Kgs., Rs. 1,61,262.

FLUOBORIC ACID: From China: Rao Insulating Co. P. Ltd., 220 lbs., Rs. 4,283.

3-FORMYL RIFAMYCIN: From Switzerland: Curekraft Chemicals P. Ltd., 249.117 Kgs., Rs. 8,21,710.

FURFURYL ALCOHOL: From Belgium: Coromandel Prodorite P. Ltd., 6,000 Kgs., Rs. 1,79,348.

GUAIACOL: From Japan: Synthokem, 6,000 Kgs., Rs. 5,99,522.

GUM ROSIN: From Indonesia: Sarvalakshmi Paper & Boards, 12 MTs., Rs. 1,09,781.

HEXAMETHYLENE DIAMINE ADIPATE: From France: Shriram Fibres Ltd., 35 MTs., Rs. 11,44,402.

HYDROXYLAMINE SULPHATE: From Japan: Arandy Labs. Ltd., 22 MTs., Rs. 5,38,542; Siris Limited, 35 MTs., Rs. 10,03,035; From USA: Prabhava Organics P. Ltd., 16 MTs., Rs. 4,76,994.

PARA HYDROXY PHENYL GLYCINE: From Singapore: Aurobindo Pharma Pvt. Ltd., 1,000 Kgs., Rs. 3,72,584.

ISOCYANATE: From U'' Vadvar Boats Pvt. Ltd., 2,500 Kgs., Rs. 1,43,135.

LABORATORY CHEMICALS: From FRG: Astra Research Centre India, 3 Nos., Rs. 11,880.

L-LYSINE: From Korea: K.R.V. Agencies, 1,000 Kgs., Rs. 67,743.

METHYLENE CHLORIDE: From Netherlands: Cheminor Drugs Private Limited, 119.340 MTs., Rs. 11,17,681.

ORTHO CHLOROBENZALDEHYDE: From Japan: Sol Pharmaceuticals Limited, 2,070 Kgs., Rs. 1,56,090.

PHENOXYETHYL CHLOROFORMATE: From France: Peroxides India Ltd., 10,000 Kgs., Rs. 10,07,670.

POTASSIUM PERSULPHATE: From FRG: Prasad Productions Pvt. Ltd., 1,500 Kgs., Rs. 41,916.

PROPYLENE GLYCOL USP: From FRG: Bush Boake Allen (I) Ltd., 34,400 Kgs., Rs. 6,69,974; From USA: Muthu Meena Agencies, 25,800 Kgs., Rs. 5,19,958.

PYRIDINE: From Belgium: IEL Ltd., 15,200 Kgs., Rs. 9,16,421.

PYRIDINE HYDROBROMIDE: From UK: Benzex Labs Ltd., 1,000 Kgs., Rs. 1,08,933.

RESORCINOL TECH. FLAKES: From USA: MRF Ltd., 1,950 Kgs., Rs. 1,58,518.

ROCK PHOSPHATE: From Jordan: Coimbatore Pioneer Fertilisers, 1,500 MTs., Rs. 17,84,237; Kothari Indl. Corpn. Ltd., 2,000 MTs., Rs. 23,78,983.

SILICON METAL: From Norway: Escorts Ltd., 50,000 Kgs., Rs. 13,24,549.

SODIUM BORATE CRUDE: From Turkey: STC, 225 MTs., Rs. 12,36,034.

SODIUM FORMATE: From Jap Tamil Nadu Chemical Products, 1 MTs., Rs. 4,44,560; Vikas Udy 20,000 Kgs., Rs. 71,128.

SODIUM HYDROSULPHIT From Japan: Standard Organics L 12.6 MTs., Rs. 2,54,361.

SODIUM METAL: From FR Prabhava Organics P. Ltd., 3.913 M Rs. 90,313.

SULPHUR HEXAFLUORID From UK: S & S Power Switchg Ltd., 8 Nos., Rs. 1,05,300.

TITANIUM DIOXIDE: From FR Widia India Ltd., 1,500 Kg Rs. 77,509; From Hong Kong: Gam Impex, 36,000 Kgs., Rs. 6,70,650; Fr Japan: Metal and Alloys Ltd., 17,0 Kgs., Rs. 3,93,654; From Switzerla Sudha Chemicals, 308 Kg Rs. 41,027.

TRICHLORO SALICYLIC ACI From UK: ICI Ltd., 6,000 Kg Rs. 16,14,379.

TRIETHYLENE TETRAMIN From USA: Gayatri Chemicals & Co ing Pro., 1,000 Kgs., Rs. 54,222.

TOLUENE SULPHONAMID From USA: Tamil Nadu Dadha Phar Ltd., 40 Kgs., Rs. 66,230.

VANILLIN TECH.: From Norwa Dr. Reddy's Labs. Ltd., 10,000 Kg Rs. 22,79,557.

PLASTIC MATERIALS IMPORTED MADRAS (From 20.12.89 to 30.12.89)

HDPE: From Brazil: Dar Intern tional, 16.5 MTs., Rs. 2,10,812; Jamp Enterprises, 16.5 MTs., Rs. 2,10,07 From Japan: Anand Plastics, 16,5 Kgs., Rs. 2,25,344; Bharath Tradi Corpn., 16 MTs., Rs. 2,12,272; Dig jai Polytex Ltd., 20,000 Kg Rs. 2,63,889; Pearlsacks P. Ltd., 16,5 Kgs., Rs. 2,22,760; Polyspin Pvt. Lt 16,500 Kgs., Rs. 2,22,751; Priya Fil ments, 16,500 Kgs., Rs. 2,24,574; Qu

lity Filaments, 16,500 Kgs., Rs. 2,19,205; Saraf Industries, 16.5 MTs., Rs. 2,24,644; Sri Bharath Knitting, 16,500 Kgs., Rs. 2,25,344; Southern Petrochemical Inds., 96,600 Kgs., Rs. 12,82,446; Ultramarine Pigments Ltd., 45 MTs., Rs. 5,92,371; Vijay Packaging Systems Ltd., 15,000 Kgs., Rs. 1,96,129; From Singapore: Hoysala Blow Moulders (I) Ltd., 34,000 Kgs., Rs. 4,91,094; From UAE: Poly Gems, 17,150 Kgs., Rs. 2,14,930; Polyolefins Inds. Ltd., 68,600 Kgs., Rs. 8,15,283.

LDPE: From Singapore: K.K. Polycolor P. Ltd., 19,800 Kgs., Rs. 3,70,241.

PVC RESIN: From France: Classic Plasto Product Ltd., 17,000 Kgs., Rs. 2,18,808; From Korea: Jabson Industries, 5,000 Kgs., Rs. 1,15,857; Polytrusions Pvt. Ltd., 91 MTs., Rs. 10,84,163; From USA: Duro Pipes P. Ltd., 17 MTs., Rs. 2,01,534; Wavin India Ltd., 1,995 MTs., Rs. 2,08,51,704.

POLYPROPYLENE: From Belgium: Kunal Engineering Co. Ltd., 15 MTs., Rs. 2,47,684; From France: M.M. Rubber Co. Ltd., 60,500 Kgs., Rs. 8,23,373; From FRG: Deccan Polypacks Ltd., 48,000 Kgs., Rs. 5,97,490; From Italy: Kunal Engg. Co. Limited, 45 MTs., Rs. 6,17,304; From Japan: ECP Ltd., 1 MT., Rs. 53,955; Sun Poly Sacks Private Limited, 15 MTs., Rs. 1,88,632.

POLYPROPYLENE: From Singapore: Ayyamperumal Nadar Sons, 16,000 Kgs., Rs. 2,30,325; Hindustan Plastics P. Ltd., 16 MTs., Rs. 2,30,325; Propyfilm Industries, 16,000 Kgs., Rs. 2,27,615; From USA: Integrated Exports, 31,780 Kgs., Rs. 3,95,588; Rabbani Exports, 23.835 MTs., Rs. 2,96,691; S.G. Industries, 15,000 Kgs., Rs. 1,94,336; Trichy Polymer P. Ltd., 16,500 Kgs., Rs. 2,04,805.

POLYSTYRENE: From Korea: Beardsell Limited, 51 MTs., Rs. 11,44,199; Gothi Plastic Industries, 51 MTs., Rs. 7,68,709; Universal Polychem. 1,02,000 Kgs., Rs. 12,43,877.

DRUG MATERIALS IMPORTED MADRAS (From 20.12.89 to 30.12.89)

AMPICILLIN SODIUM STERILE BP/USP: From Cyprus: Tamil Nadu Dadha Pharma Ltd., 100 Kgs., Rs. 1,48,960.

BUTYLATED HYDROXY ANISOLE BP: From Japan: Blue Pharmco, 500 Kgs., Rs. 70,283.

ERYTHROMYCIN THIOCYANATE: From USA: Pradeep Drug Company, 749.5734 Kgs., Rs. 9,21,020.

MORPHOLINE: From USA: Coastal Pharma Chemicals, 5,018 Kgs., Rs. 2,02,175.

OXETHAZAINE JP: From China: Tamil Nadu Dadha Pharma Ltd., 50 Kgs., Rs. 1,41,763.

PENICILLIN G POTASSIUM: From Japan: TTK Chemicals Ltd., 6,952 Kgs., Rs. 31,48,101.

REGD. NO. TN/MS (C) 395 ISSN 0045/6500 R. N. NO. 1972/57